

A photograph of a large, multi-story, light-colored building, identified as the Mansoura University Children's Hospital. The building has many windows and a central entrance. In the foreground, there is a paved area with some parked cars and a street lamp. The sky is blue with some clouds.

Neonatal Radiography

By

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Neonatal Chest Radiography

- Technical factors
- Interpreting the film:
 - Technical quality
 - Scanning the frontal film
 - Scanning the lateral film
- Pitfalls in radiological diagnosis
- Approach to common neonatal chest problems

Technical factors:

- The baby remains supine, the film (under the baby) is exposed with the x-ray tube above the AP projection.
- Lateral film may be taken by turning the baby onto its side.
- Lateral film may be also taken as a “cross-table lateral” i.e. with the baby supine and the beam directed through the baby’s side (esp. for free air detection).



Interpreting the film:

Technical quality:

- **Projection:**
 - AP view
 - Lateral view
- **Orientation:**
 - Check left / right markings
- **Degree of inspiration:**
 - Count the ribs above the diaphragm.



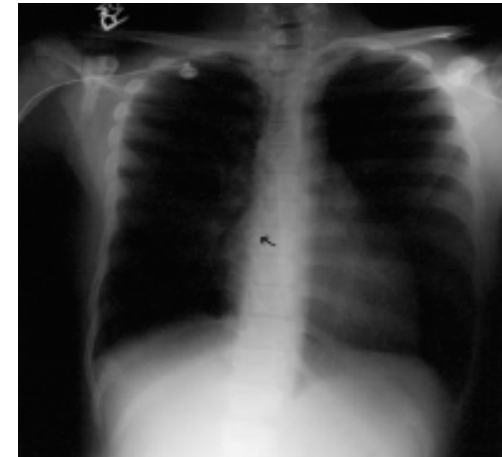
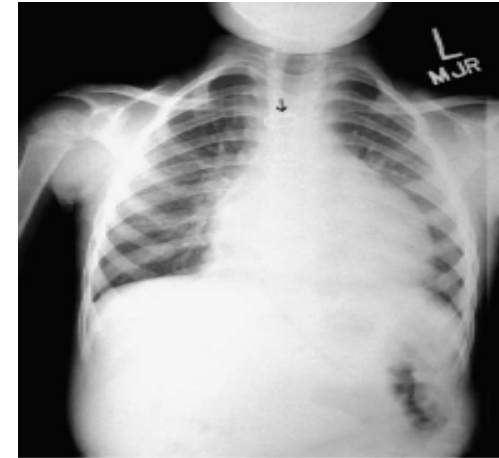
Interpreting the film:

- **Rotation:**

Identify medial ends of the clavicles, equidistant from spinous process.

- **Penetration:**

Look at lower part of cardiac shadow, vertebral bodies visible at this point only.



Interpreting the film:

Scanning the frontal film:

- **Lung fields:**
 - Should be of equal transradiancy.
 - Determine lung volume.
 - Look for discrete or generalized shadows.



Interpreting the film:

Scanning the frontal film:

- **The hilum:**
 - Left hilum is higher than right hilum.
 - Compare shape & density of both hila.
 - Should be concave and look similar.



Interpreting the film:

Scanning the frontal film:

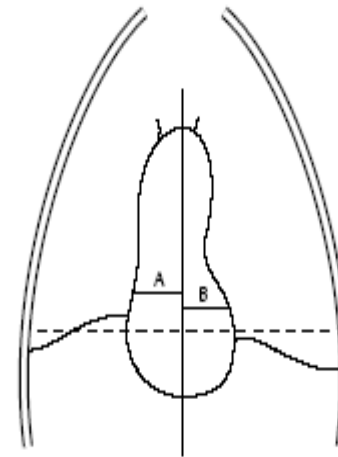
- **The pulmonary vessels:**
 - At the hila and medial third of the lungs.
 - Seen in lateral two-thirds of the lung in vascular congestion.



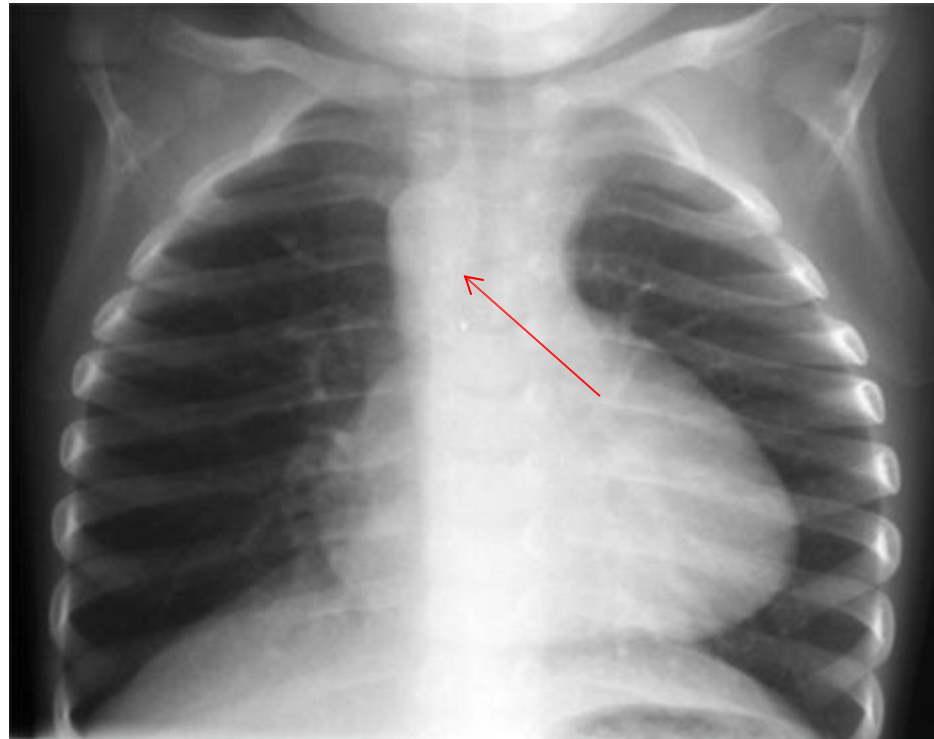
Interpreting the film:

Scanning the frontal film:

- **The heart & mediastinum:**
 - Check shape of heart.
 - Maximum diameter of heart should be $< 55\%$ of transthoracic diameter.



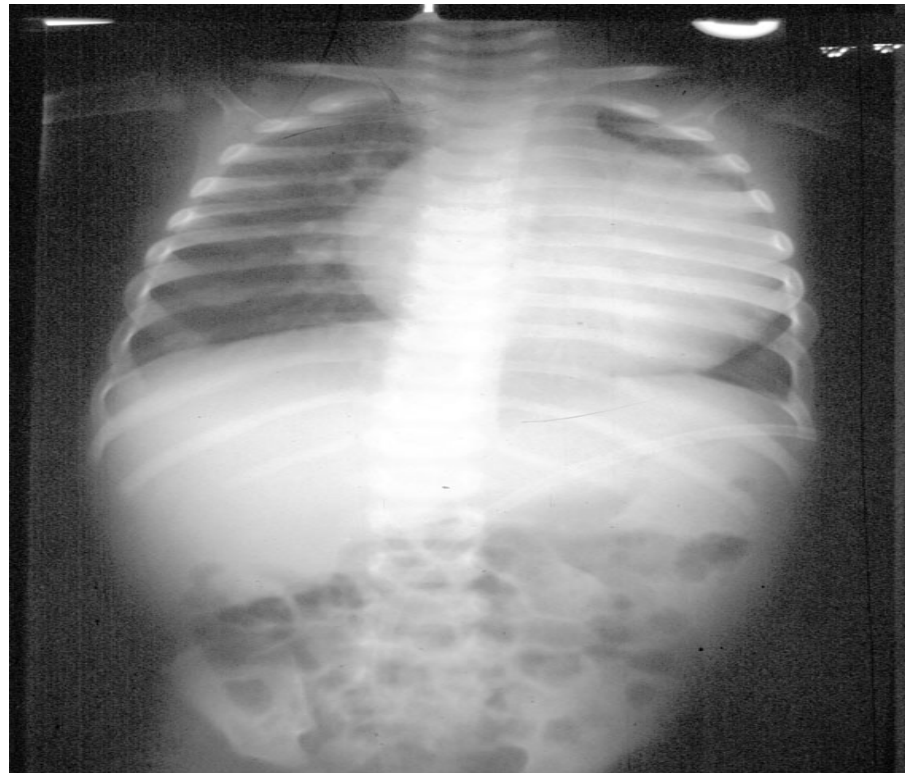
Tetralogy of Fallot



situs of Ao. arch is defined by which of the mainstem bronchi the arch crosses. This is best determined by noting which side of the trachea is indented on the anteroposterior image; the indentation indicates on which side the aortic arch is coursing

Normal anatomy is a left-sided aortic arch with indentation of the left side of the trachea as the arch crosses over the left mainstem bronchus.

Transposition of Great Arteries (TGA)



The classic chest radiograph features a heart with an “egg on a string” appearance, which is thought to be a result of the great arteries forming a narrowed vascular pedicle when transposed

Interpreting the film:

Scanning the frontal film:

- **The diaphragm:**
 - Right copula should be higher than left.
 - Its outline is smooth.



Interpreting the film:

Scanning the frontal film:

- **The costophrenic angles:**
 - Well defined acute angles.
- **The trachea:**
 - Central but deviates slight to right.



Interpreting the film:

Scanning the frontal film:

- **The bones:**
 - Look at ribs, scapulae & vertebrae for fractures & compare density.
- **Soft tissues**
- **Area under diaphragm**





Interpreting the film:

Scanning the lateral film:

- **The diaphragms**
- **Lung fields:**
 - In front & above the heart compared to behind it.
- **Retrosternal space**



Interpreting the film:

Scanning the lateral film:

- **Hilar density**
- **Costophrenic angles:**
 - Pleural effusion → blunting of angles ant. or post.
- **Vertebral bodies:**
 - Shape, size & density.



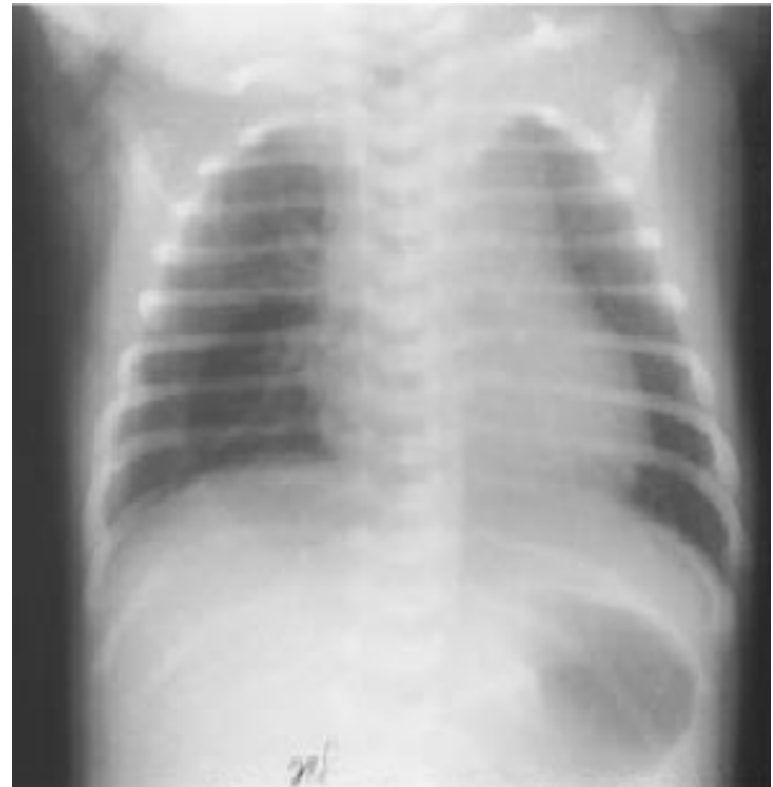
Pitfalls in radiological diagnosis:

- **Inspiratory and expiratory films for the same neonate. Note changes in lung inflation, size of the thymus and the trachea.**



Pitfalls in radiological diagnosis:

- **Artifact resulting from the hole in the incubator hood.**



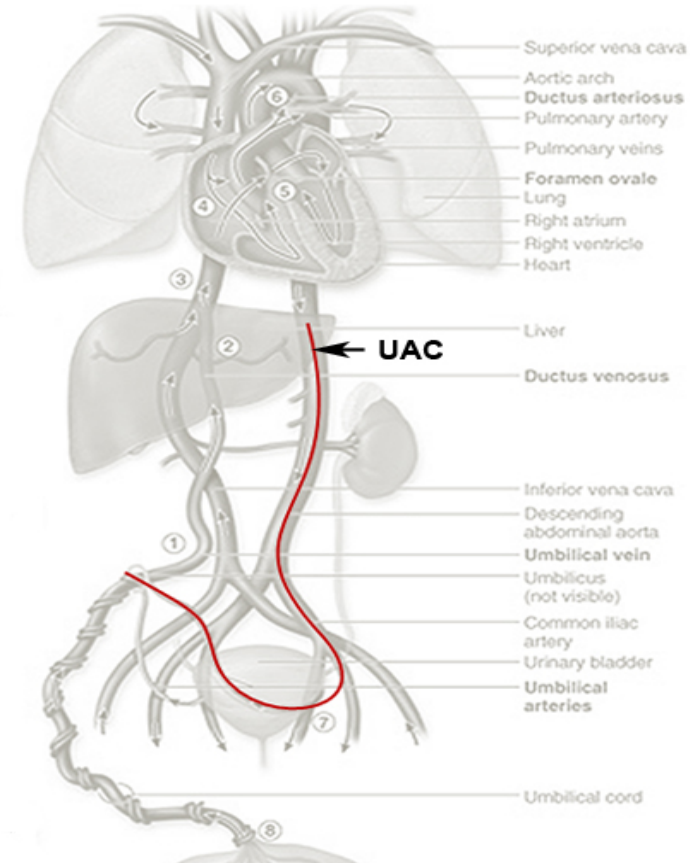
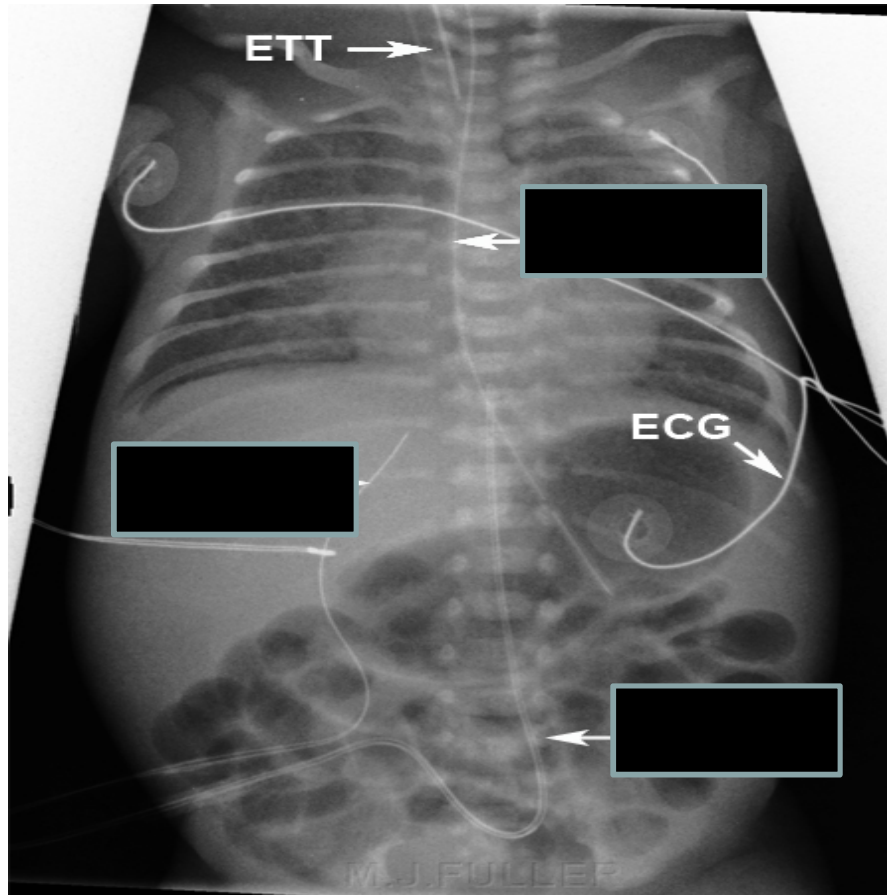
Pitfalls in radiological diagnosis:

- **Artifact resulting from skin fold**



Umbilical Vascular Catheters

Umbilical Arterial Catheter



umbilical artery catheter (UAC) characteristically deviates inferiorly before tracking up the aorta

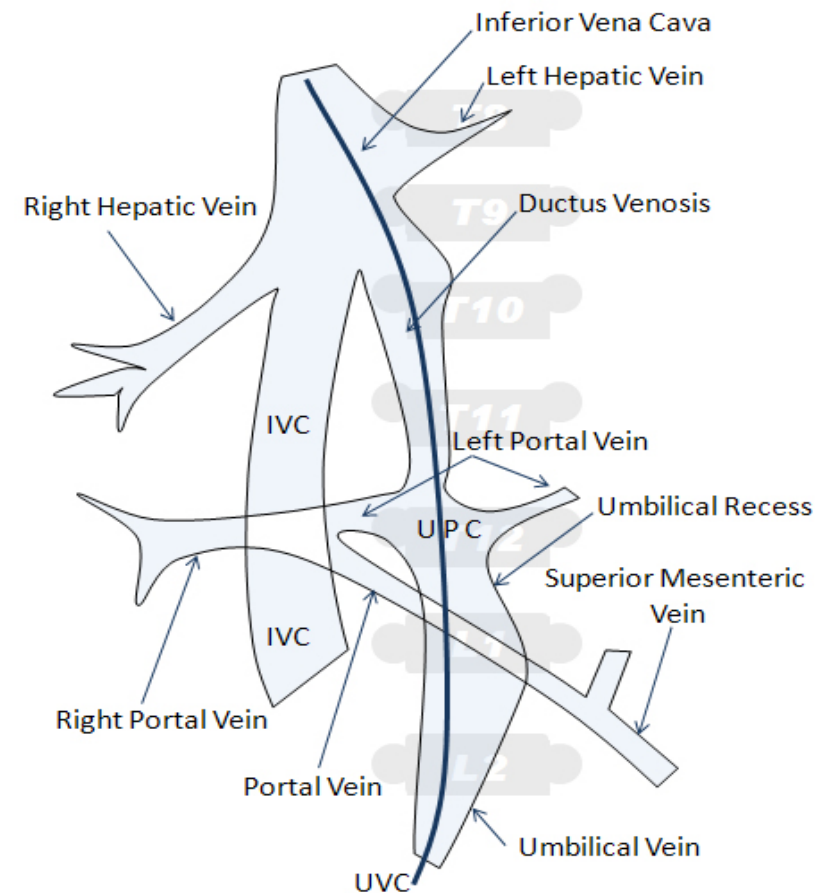
Umbilical Venous Catheter

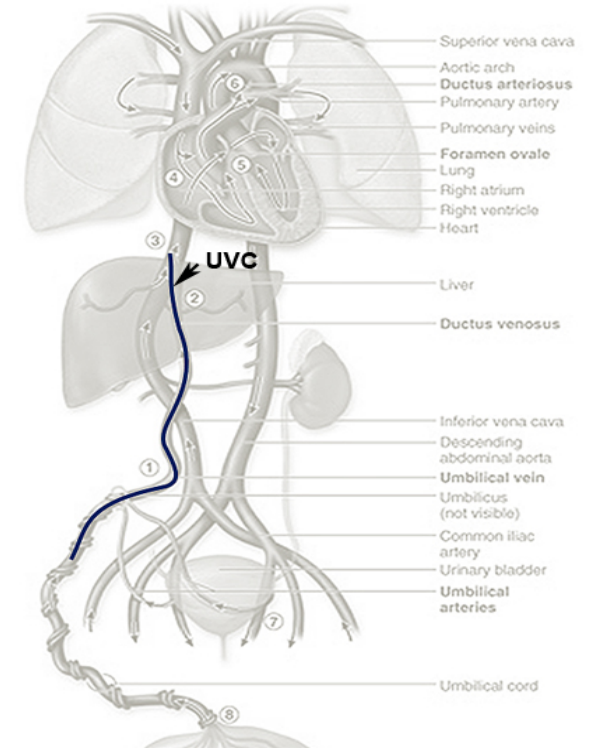
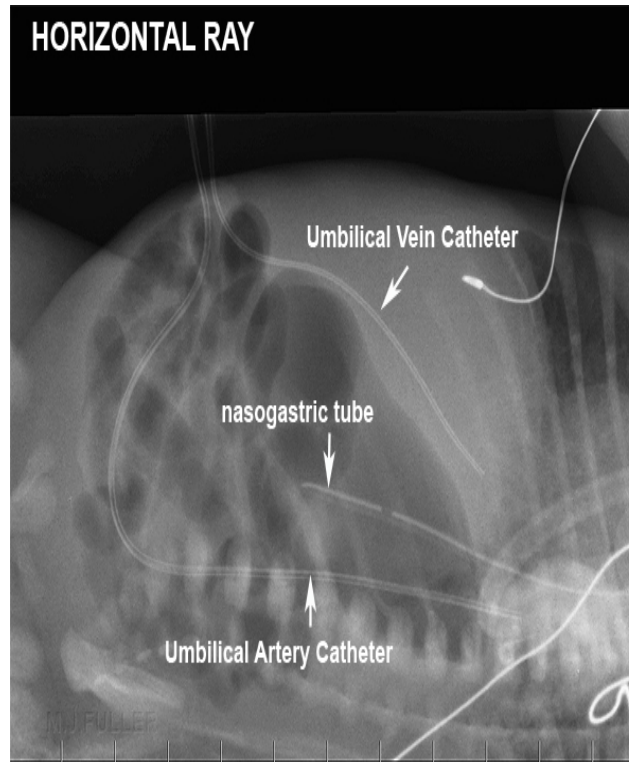
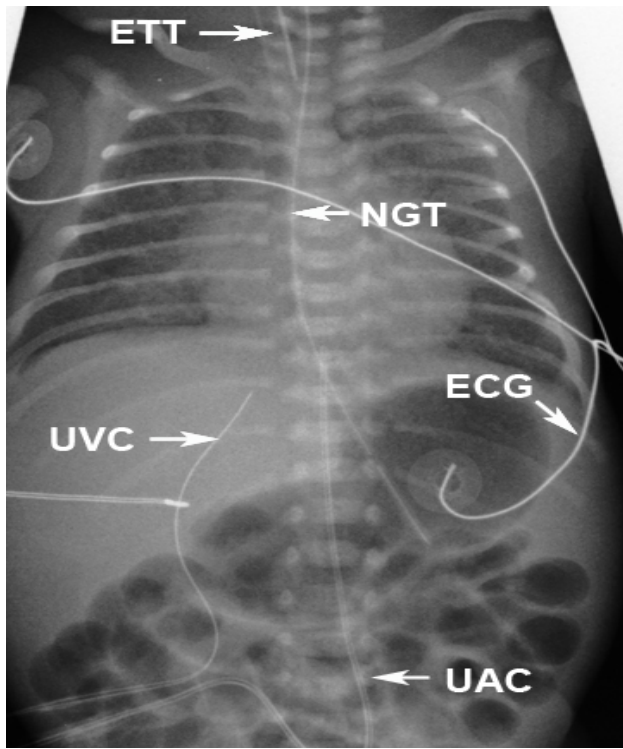
UVC normally moves up the **umbilical vein** in a cranial direction where ➡ the junction with the left and right portal vein within the liver.

➡ **DV.**

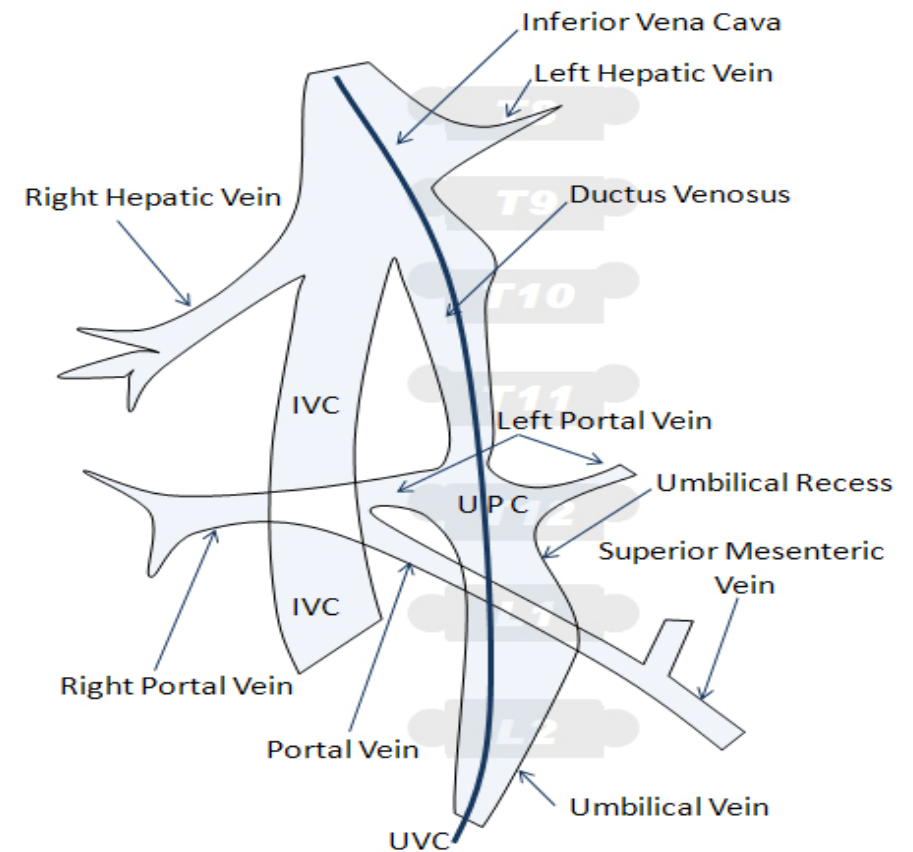
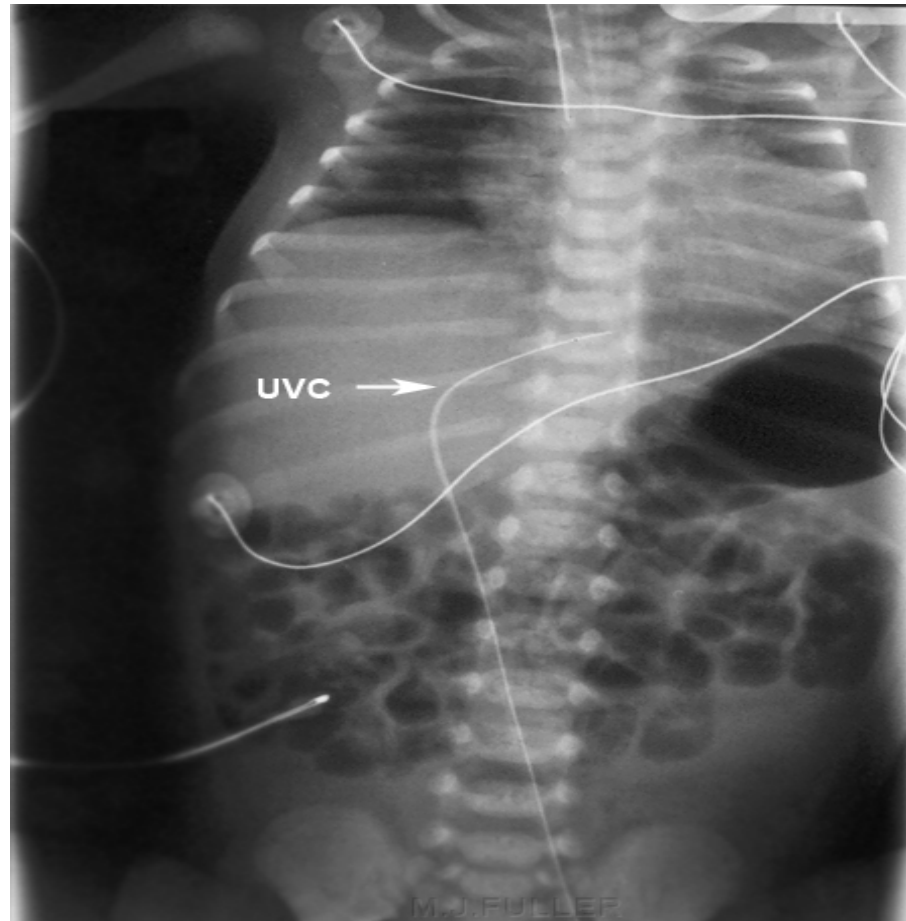
After travelling through the DV it encounters a second venous cross-roads at **the level of the left and right hepatic vein**. On travelling further in a cranial direction the UVC enters the **IVC**

Note the positions of the vertebral bodies- these might have taken a wayward path provide a guide as to where the UVC

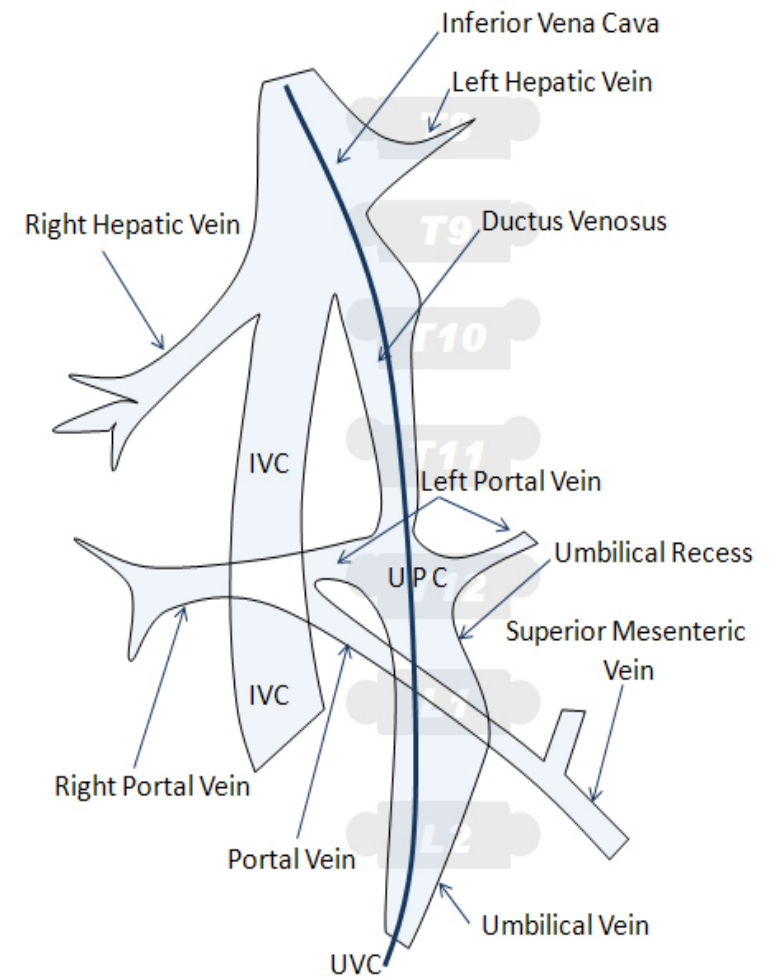
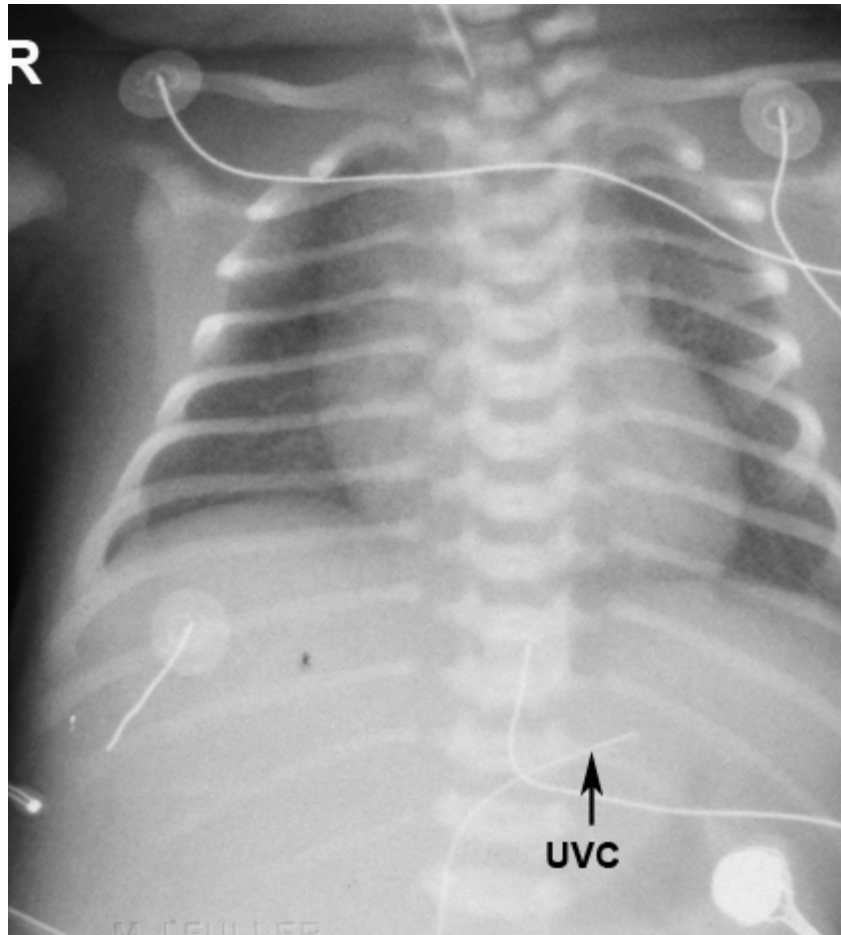




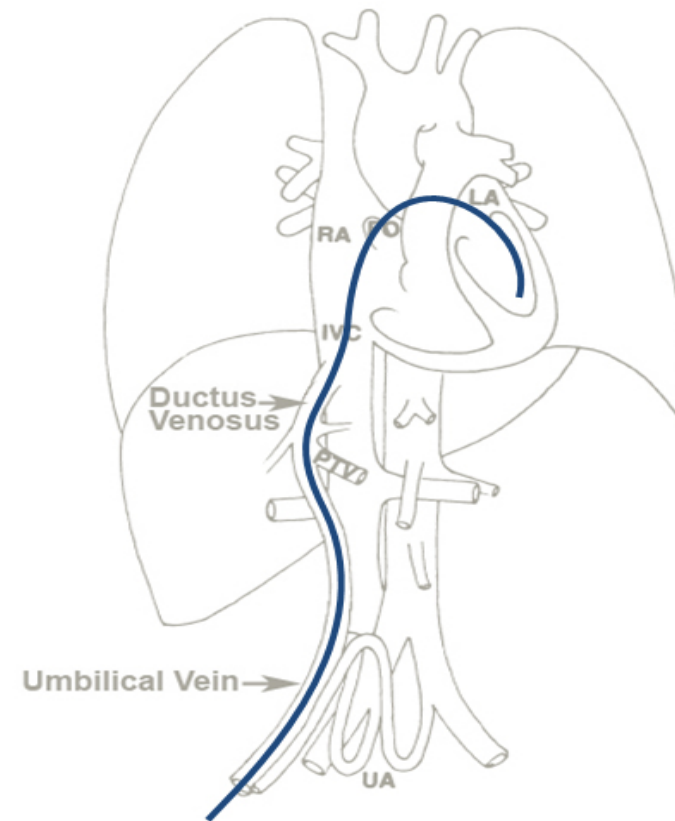
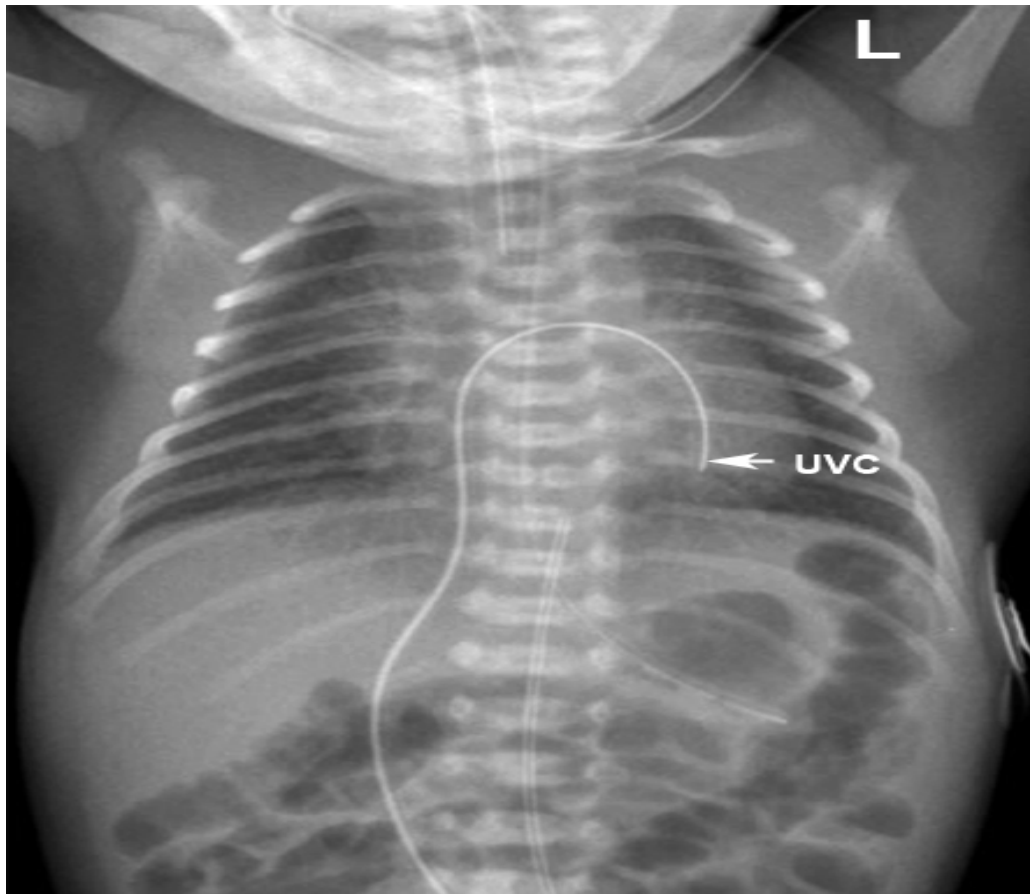
This lateral image gives an appreciation of the course of the umbilical vein and DV in relation to the liver



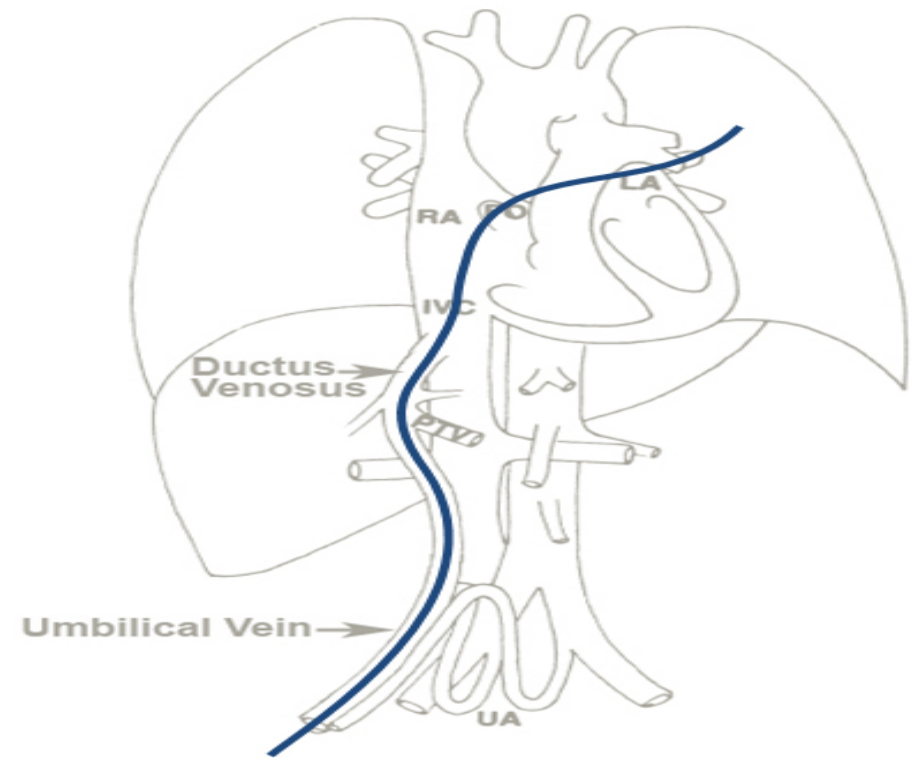
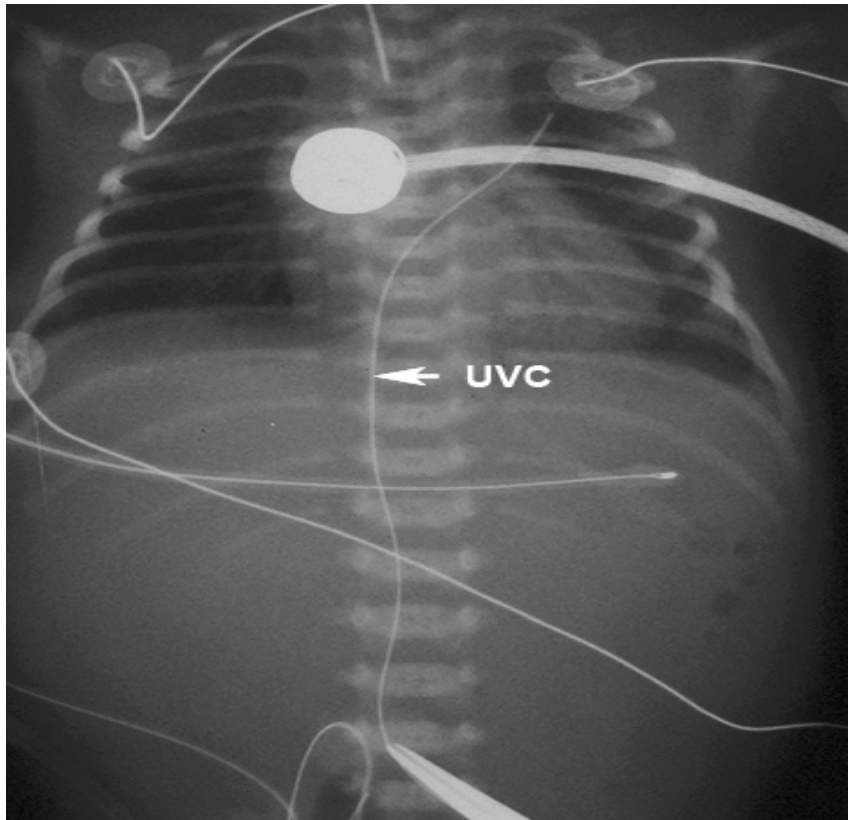
UVC has deviated to the left at T8 which is the level of the left hepatic vein. The UVC tip is most likely to lie within the left hepatic vein



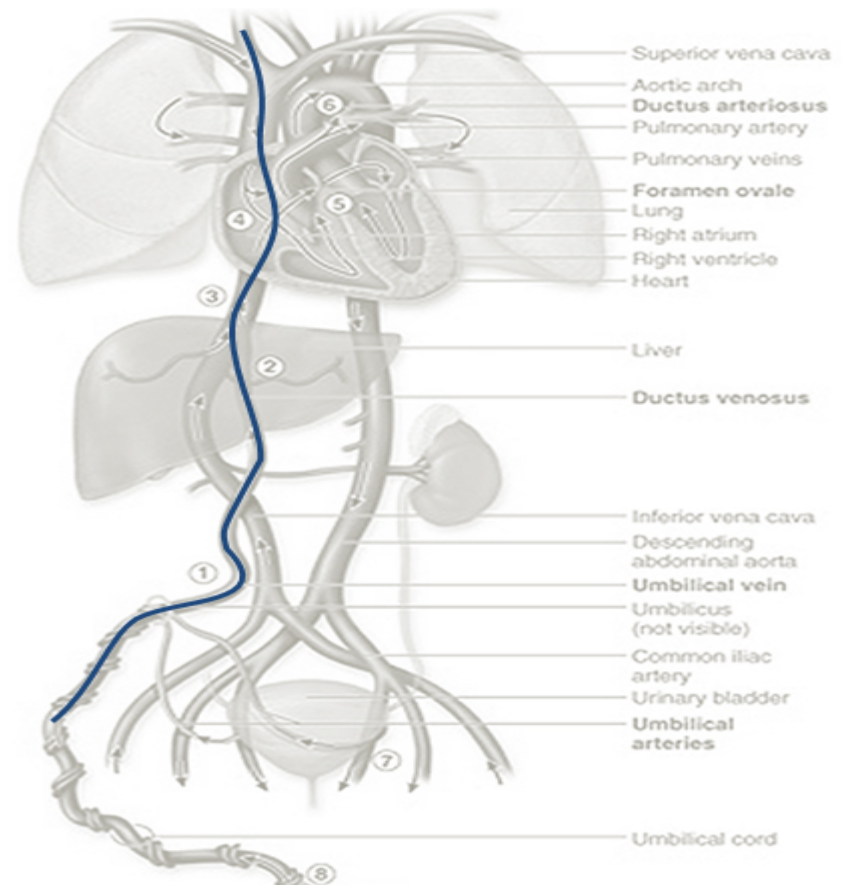
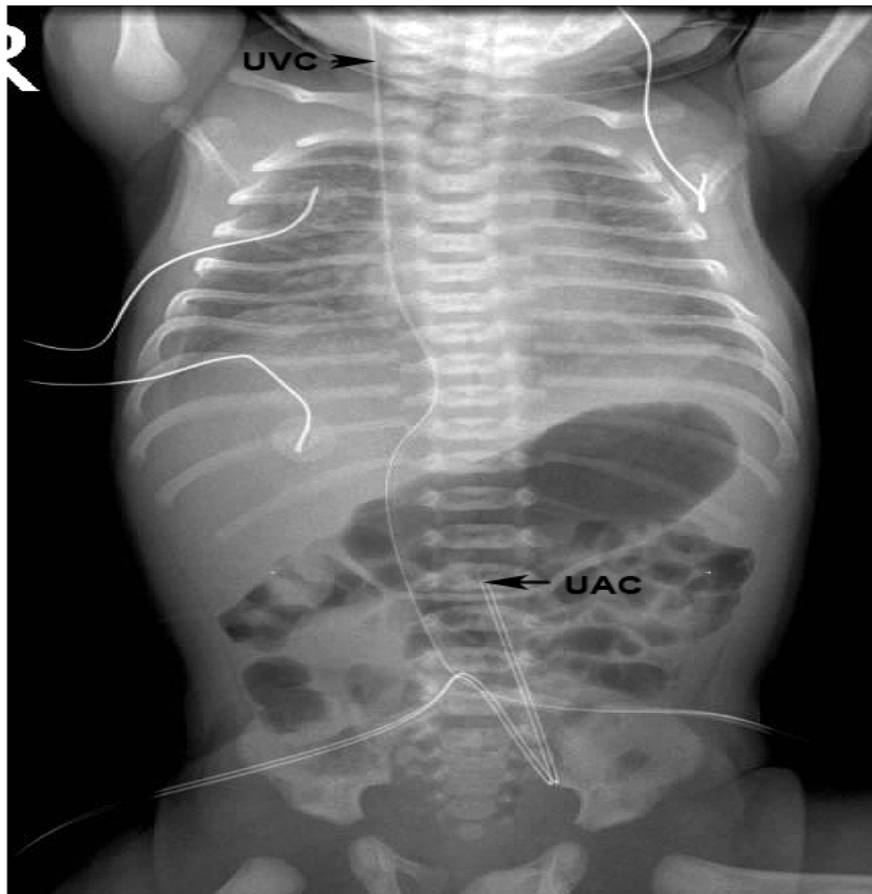
similar appearance to the case above but at T11. This is the level of the left portal vein and most likely represents its tip position.



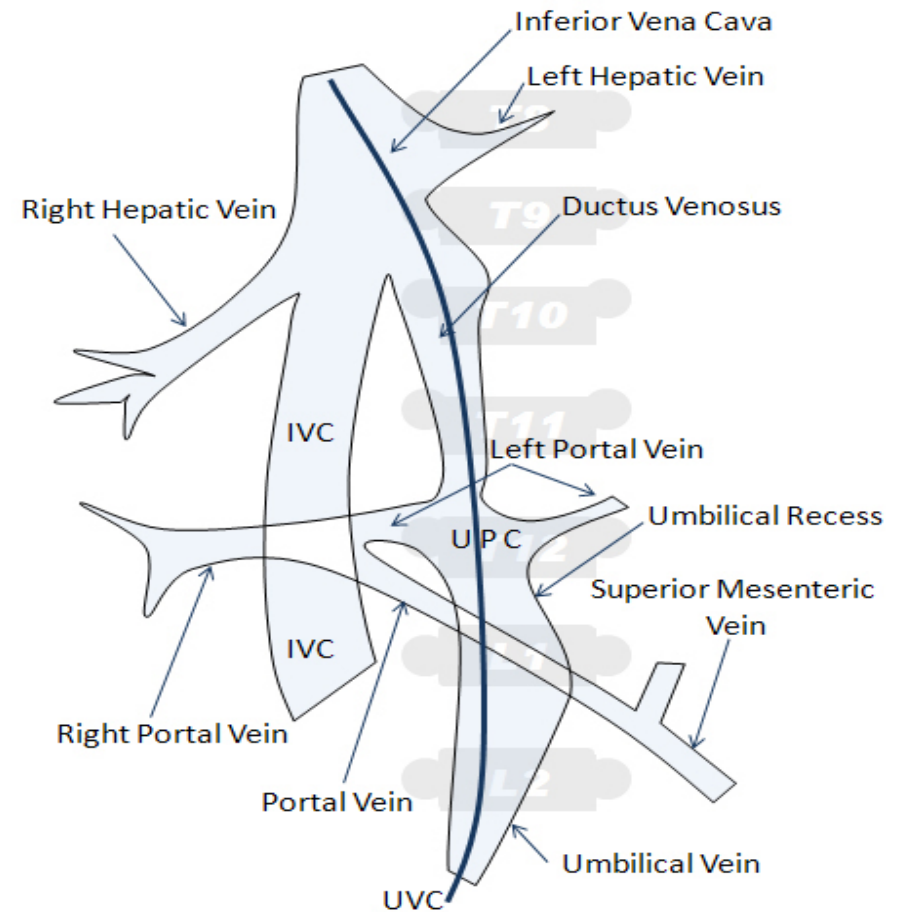
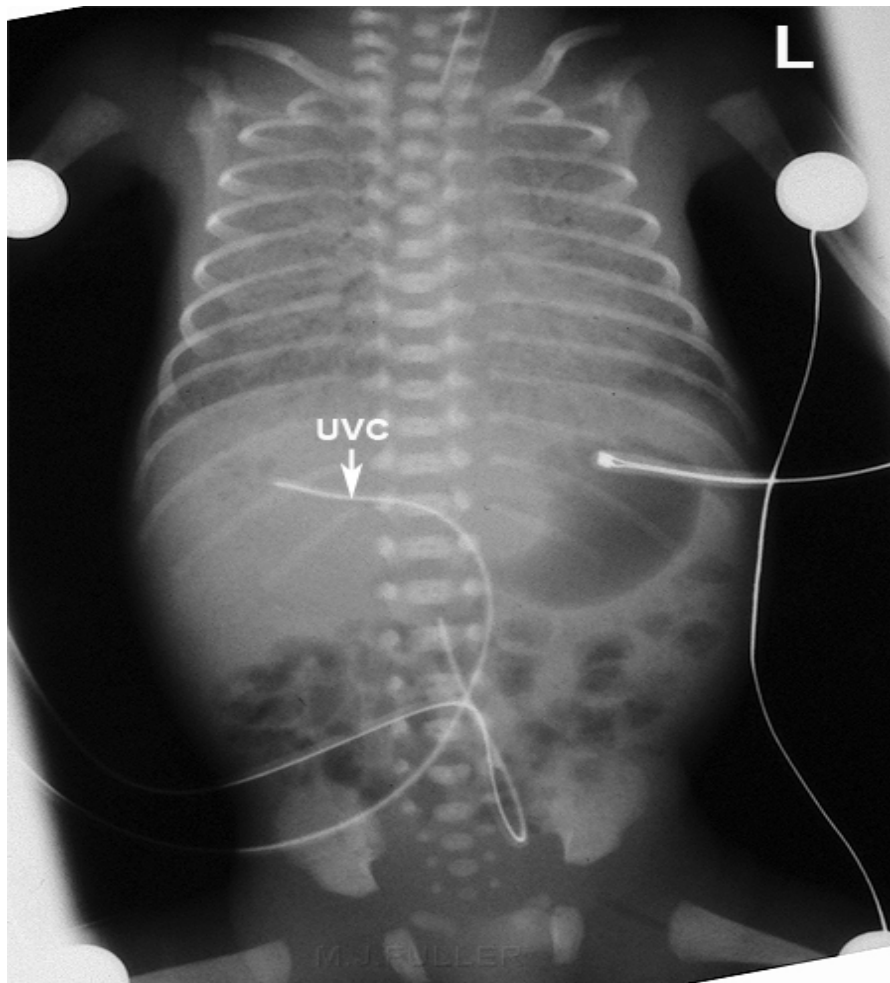
UVC extends across foramen ovale into the left atrium then left ventricle



The UVC tip is in the pulmonary vein



UVC into jugular vein



The UVC deviates to the right at the level of the right portal vein. Air in portal venous branches associated with umbilical venous catheter insertion

Approach to common neonatal chest problems

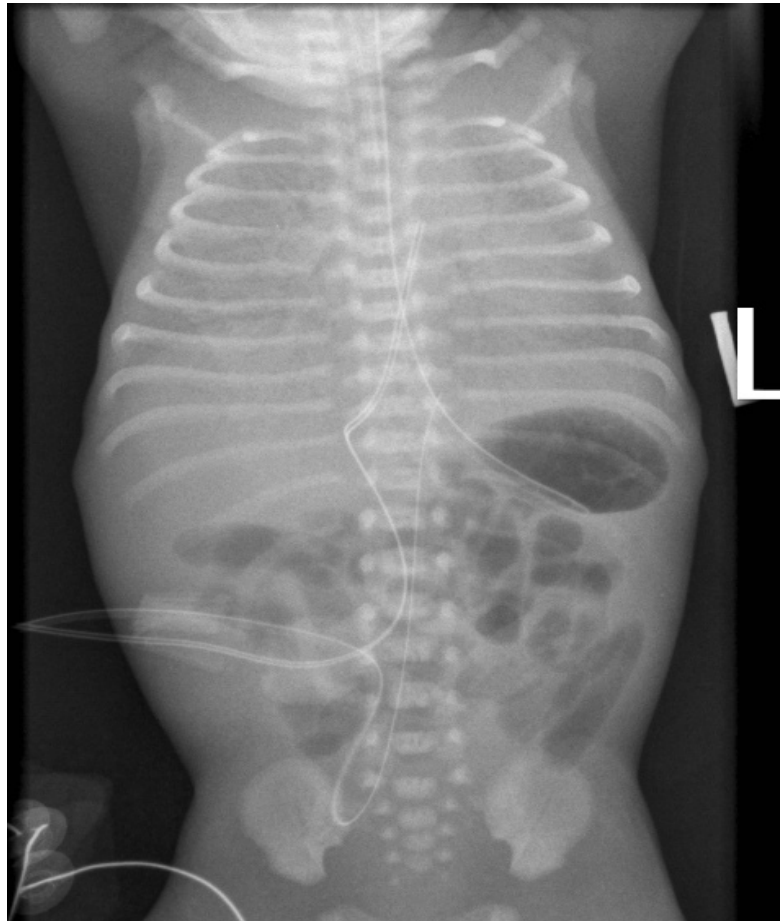
Male baby, delivered at 31 wks GA. The mother had premature labour pain, she didn't receive corticosteroids prior to delivery.

Soon after birth, the baby developed tachypnea, chest retractions & grunting.

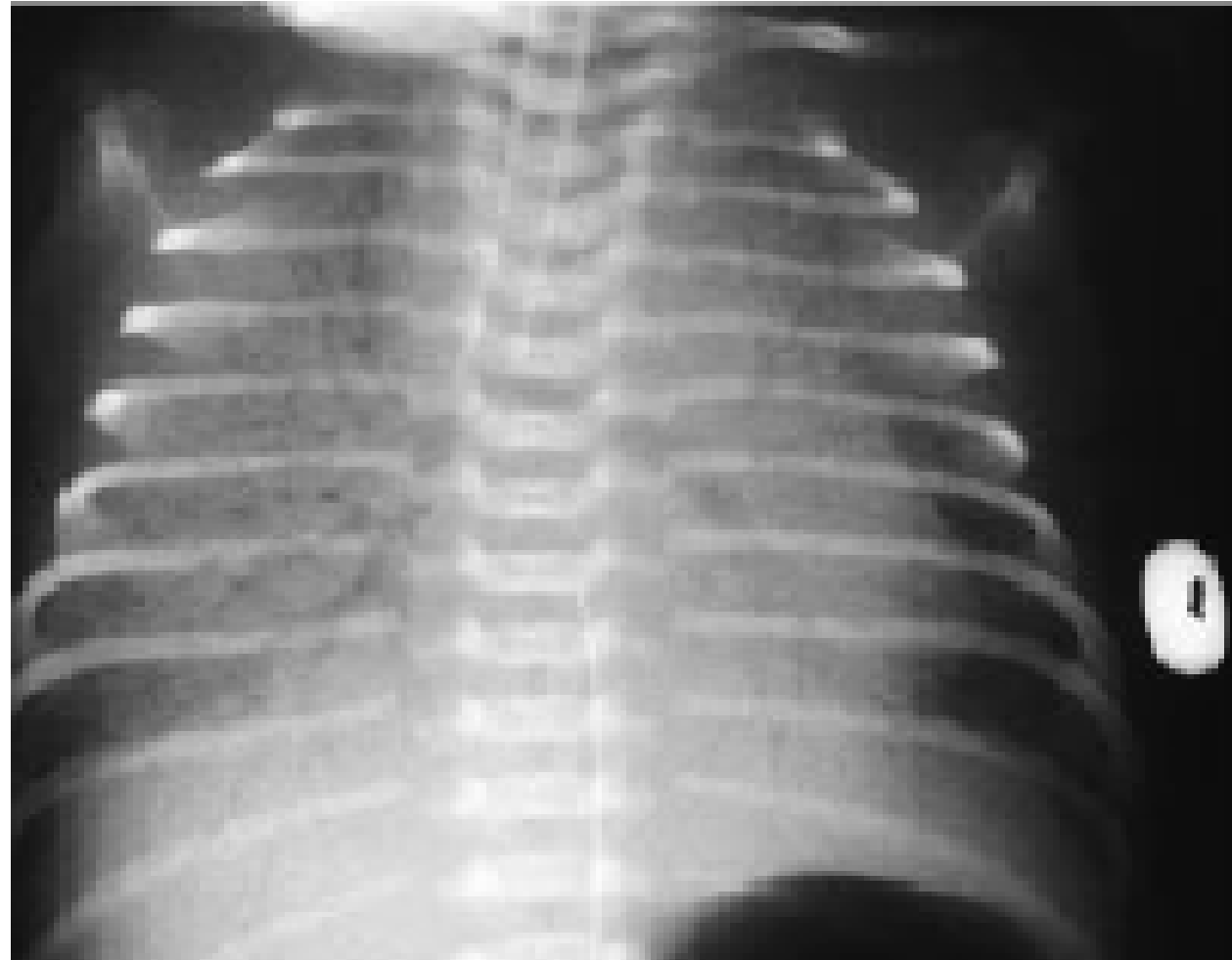
It was placed on nasal CPAP had ABGS revealing respiratory failure.

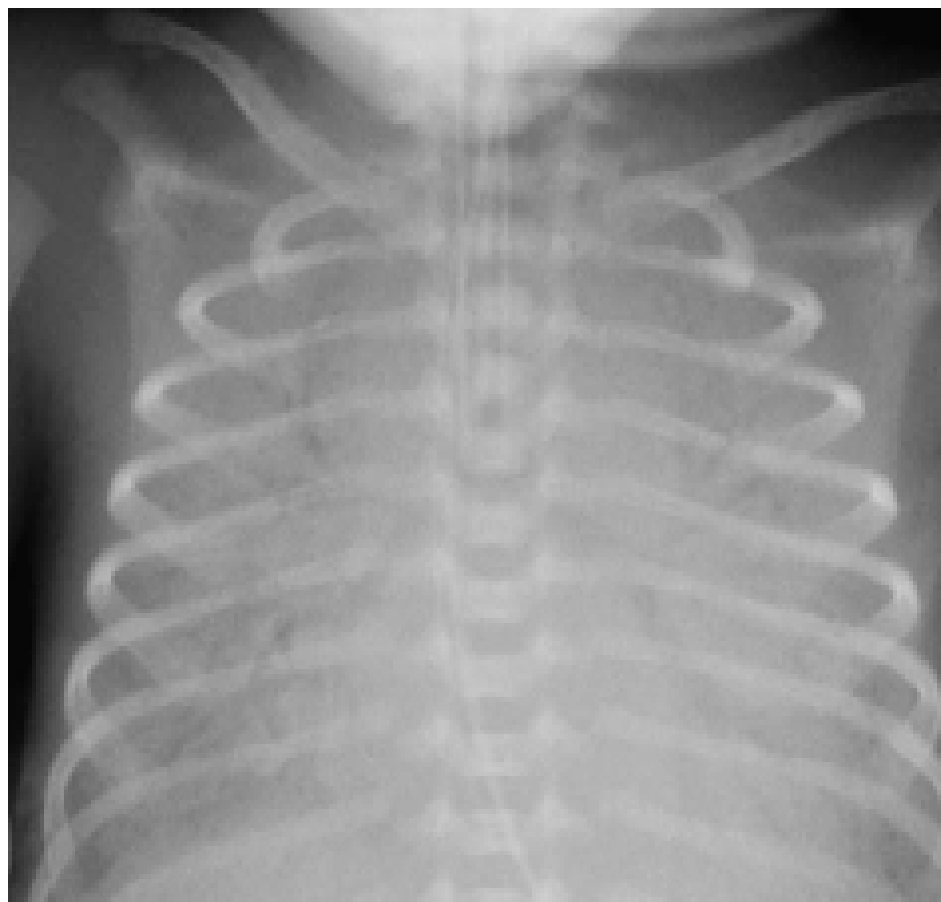
It was ET intubated and placed on mechanical ventilation.

Hyaline Membrane Disease

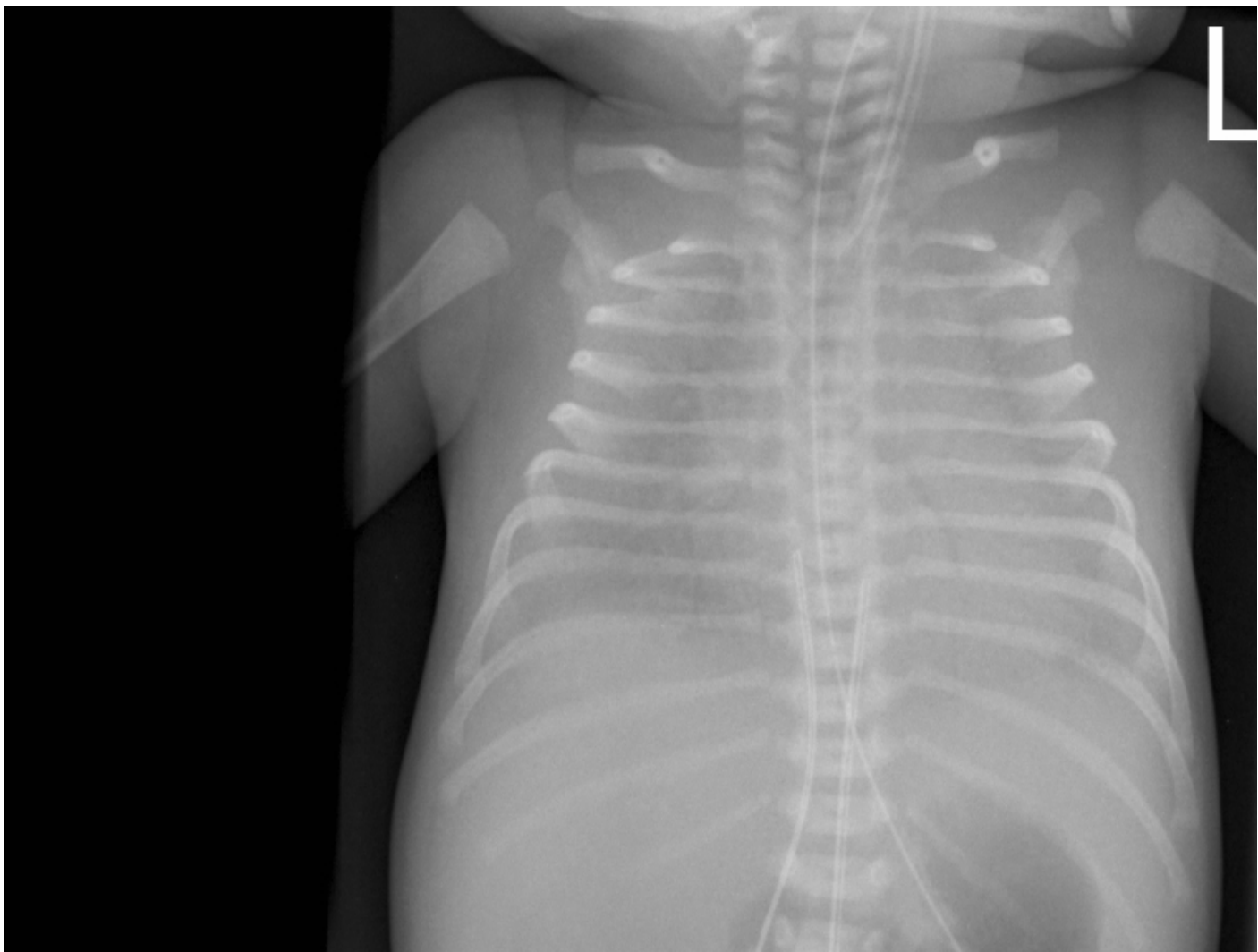


Diffuse granular appearance of both lung fields
Bilateral air bronchogram







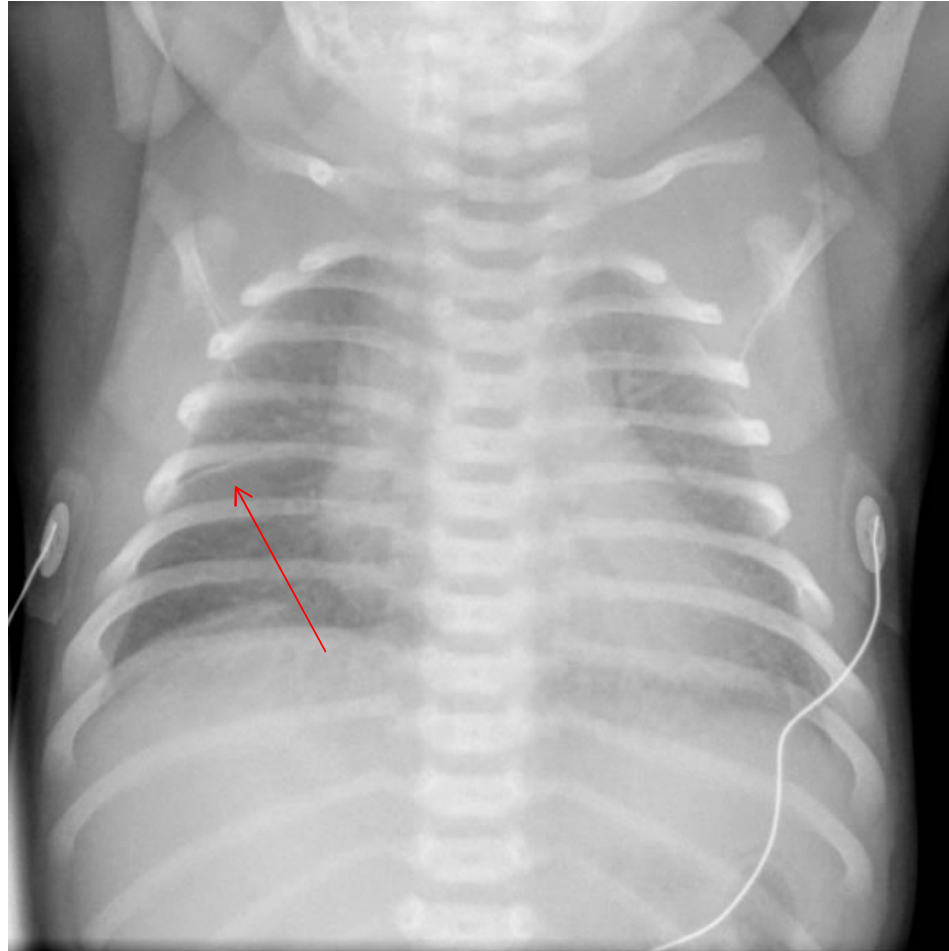


Male full-term baby, delivered by CS.

Three hours after birth, the baby developed tachypnea & chest retractions.

It received O₂ by head box.

Transient Tachypnea of Newborn



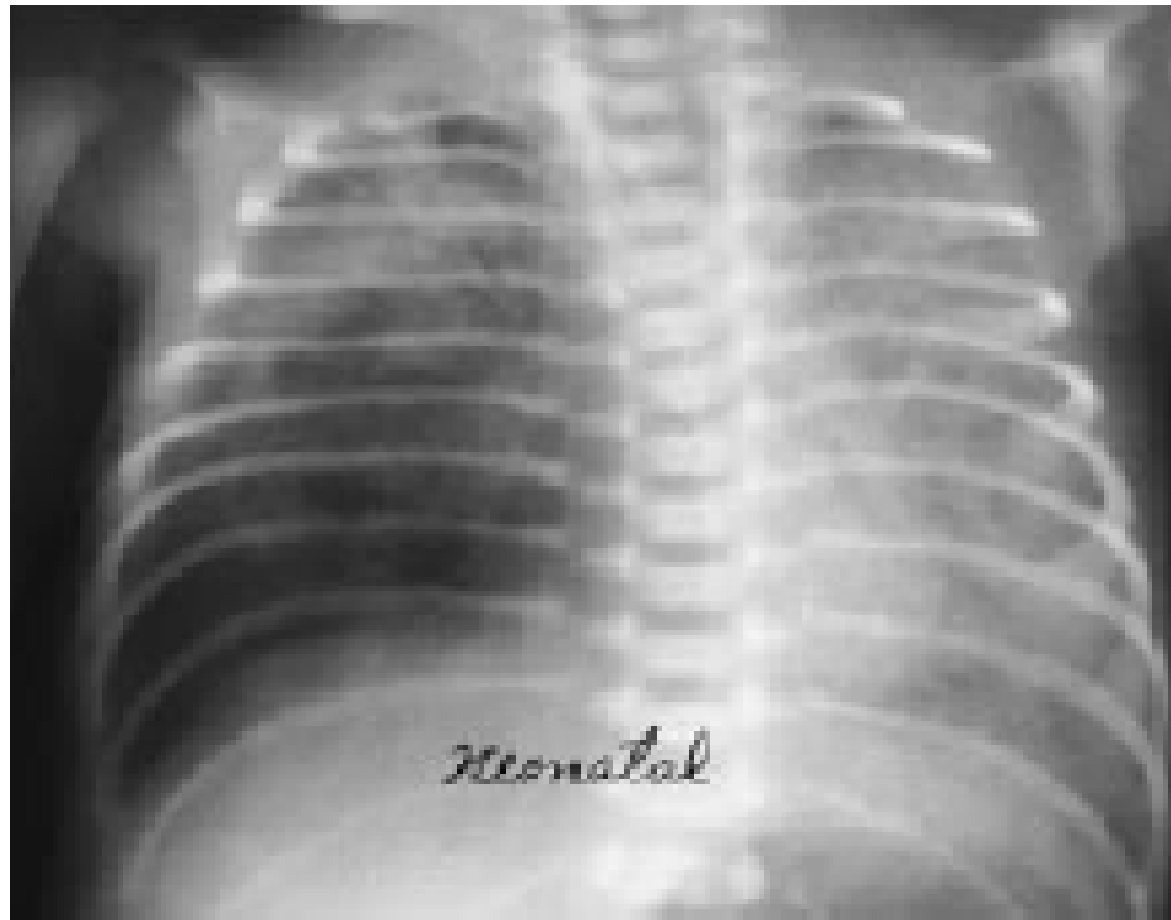
Fluid is seen in the interlobar fissures,

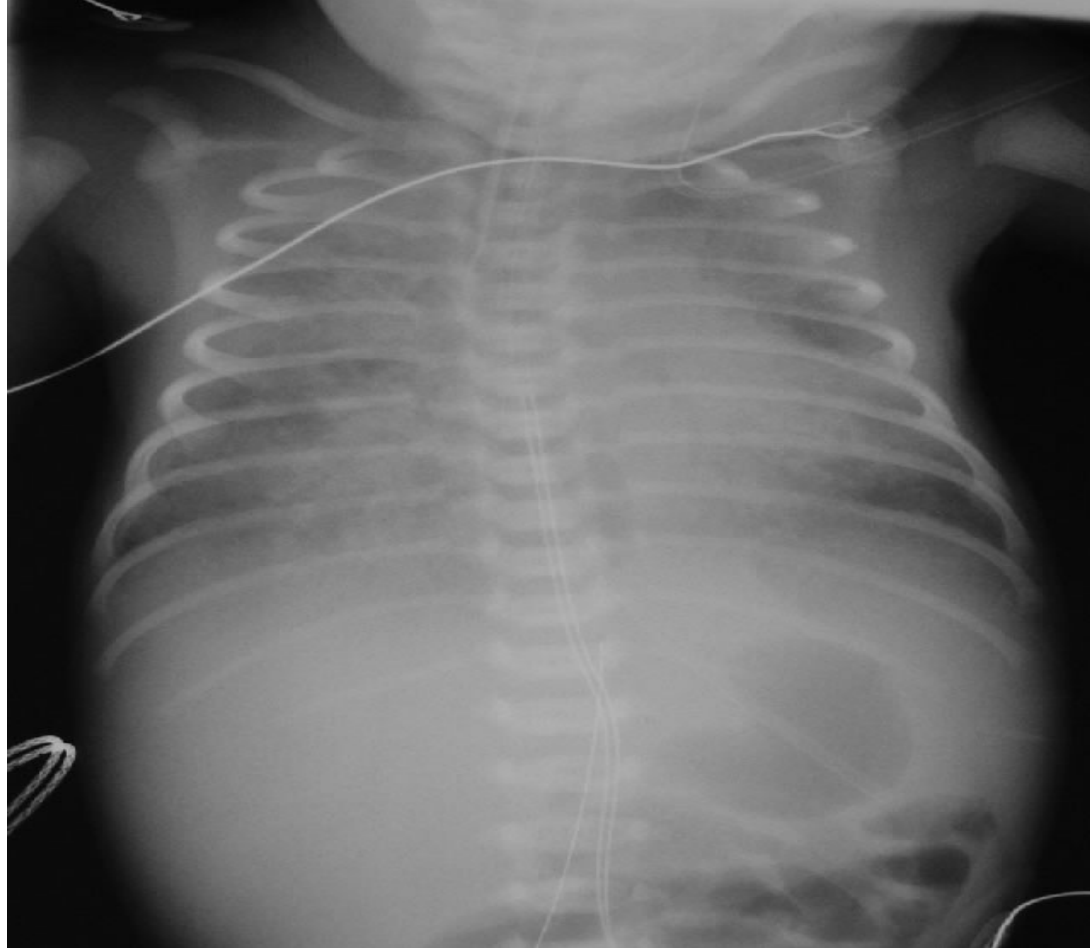


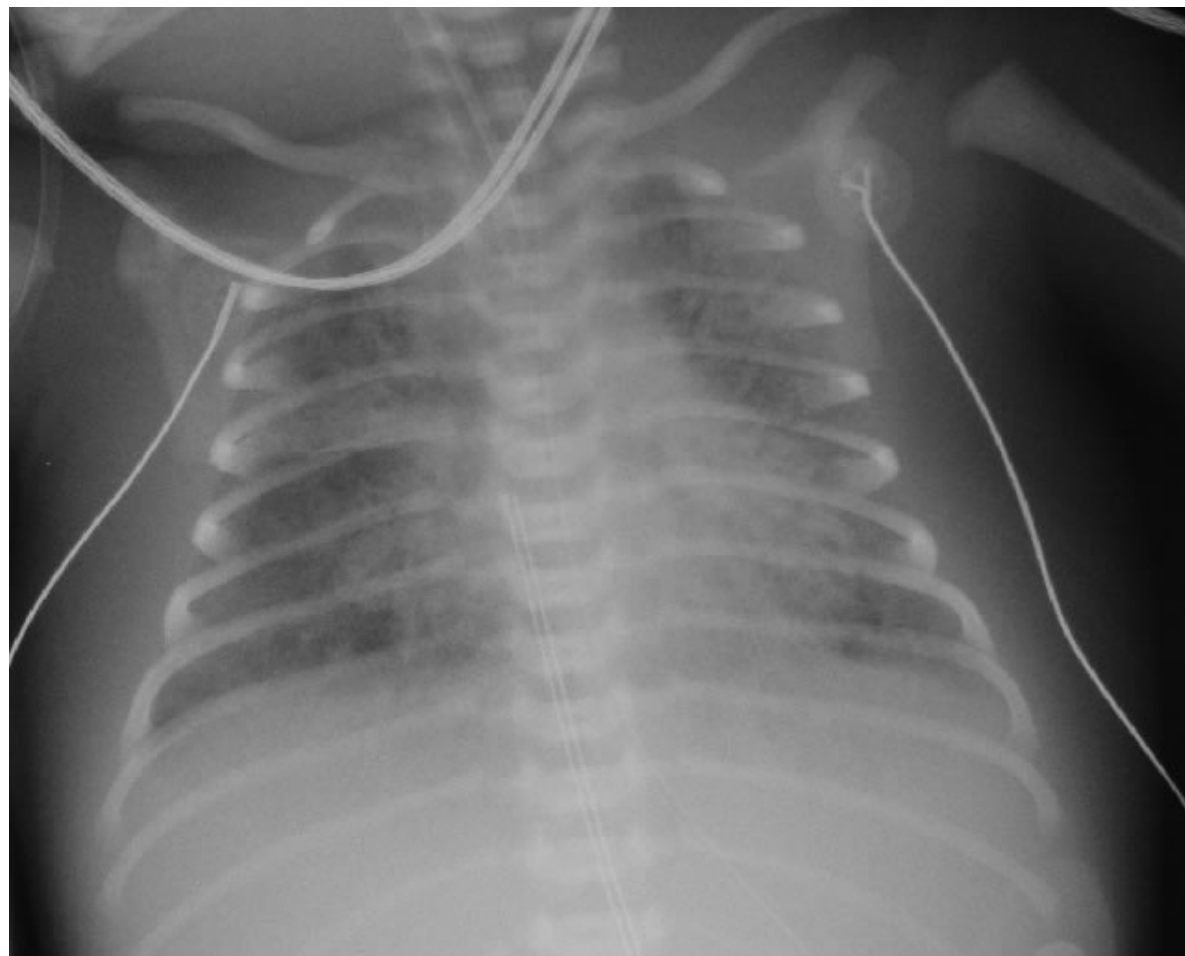
increased lung volumes with flat diaphragms, mild cardiomegaly,
and prominent vascular markings in a sunburst pattern originating
at the hilum.

Full-term baby, delivered to a mother with chorioamnionitis who received antibiotics for one week → fetal distress → born in poor condition → ET intubated & ventilated.

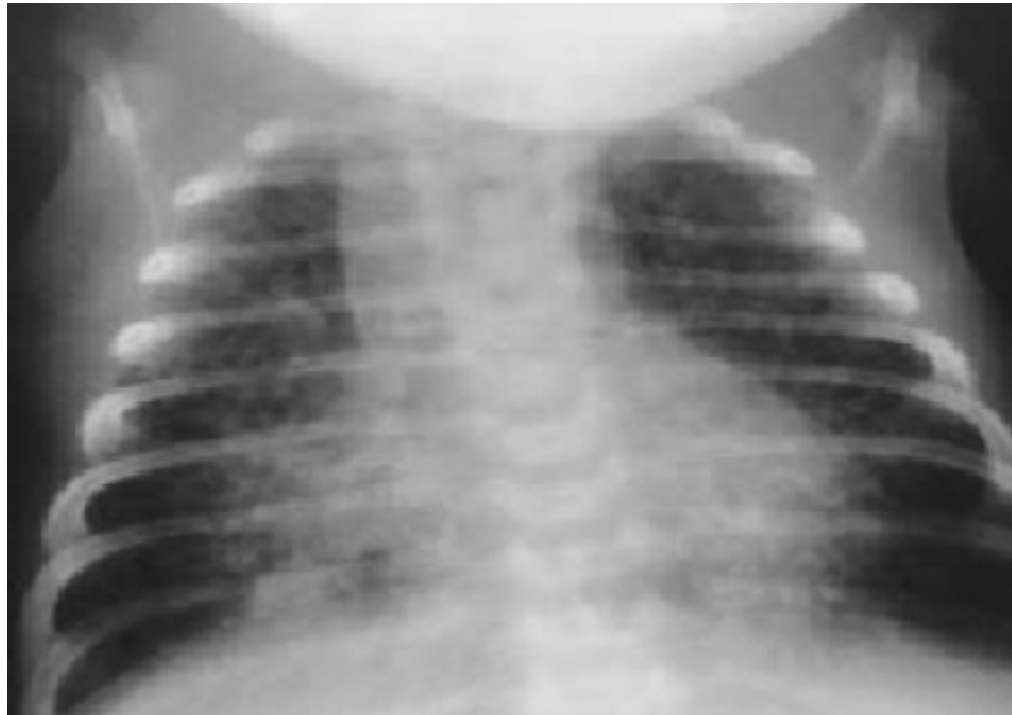
Pneumonia



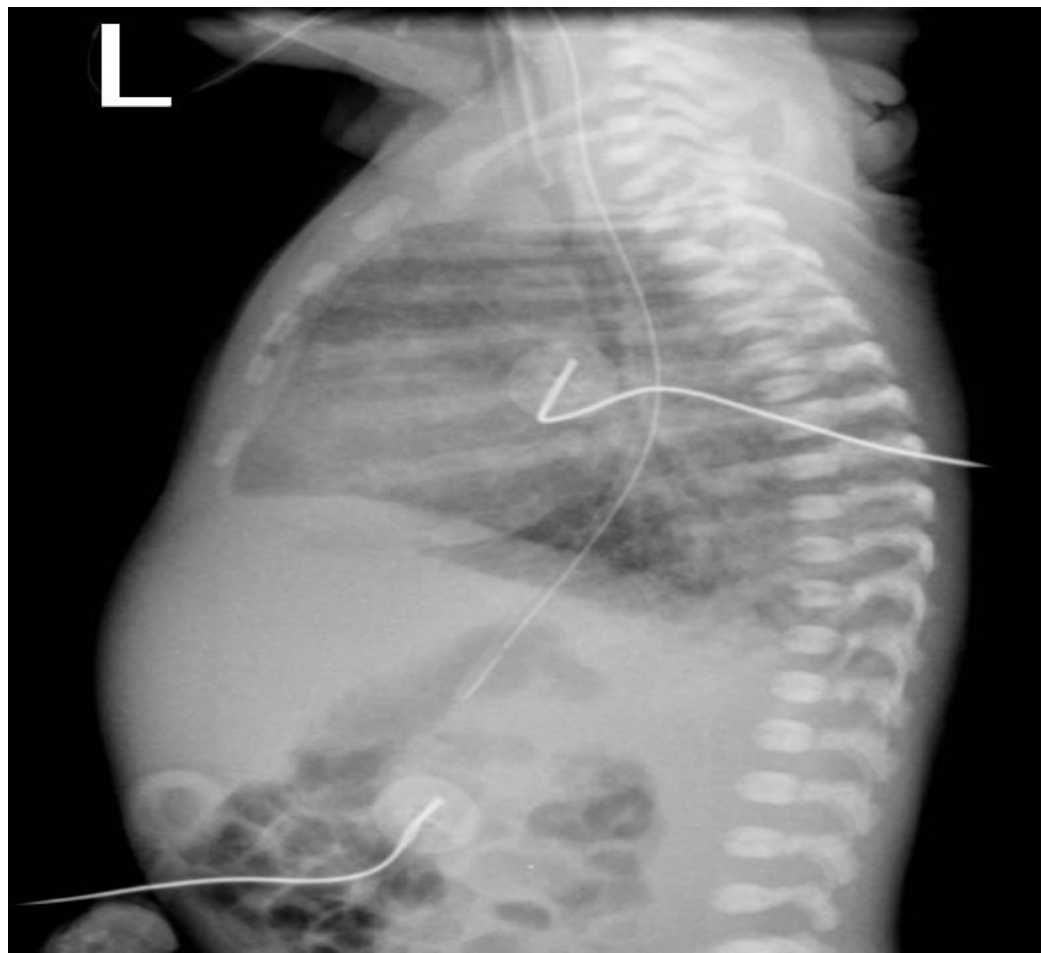




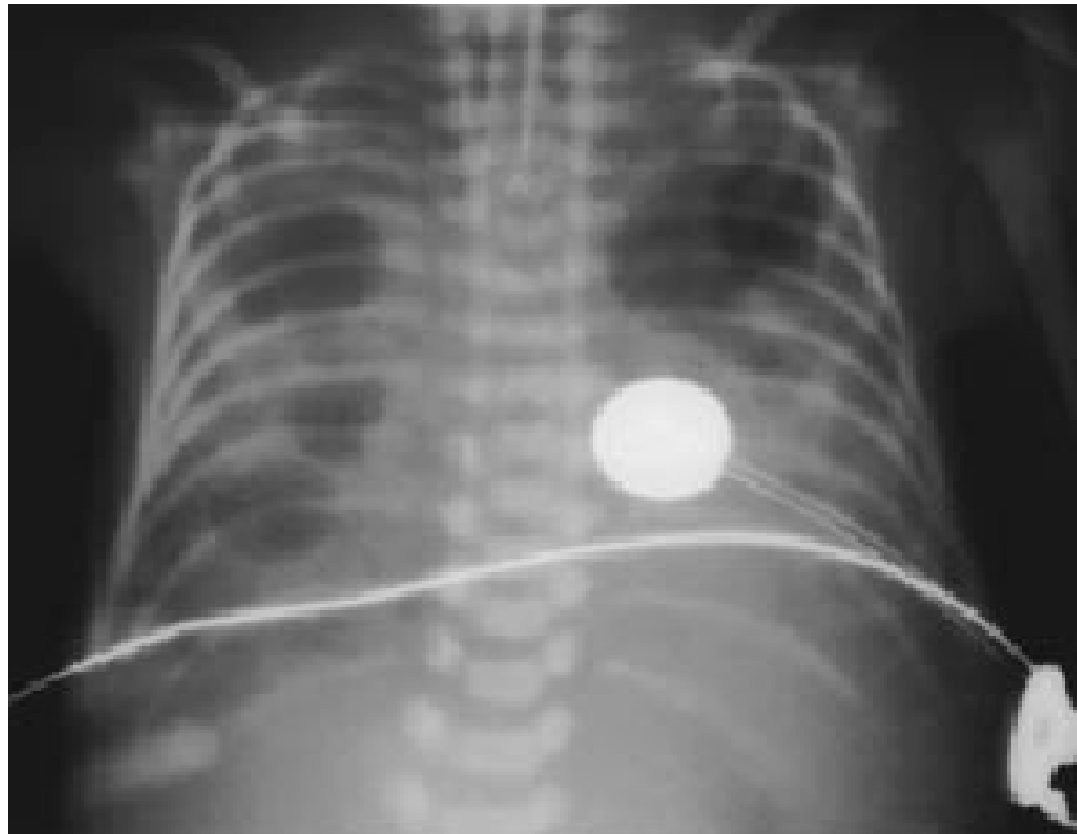
pneumonia





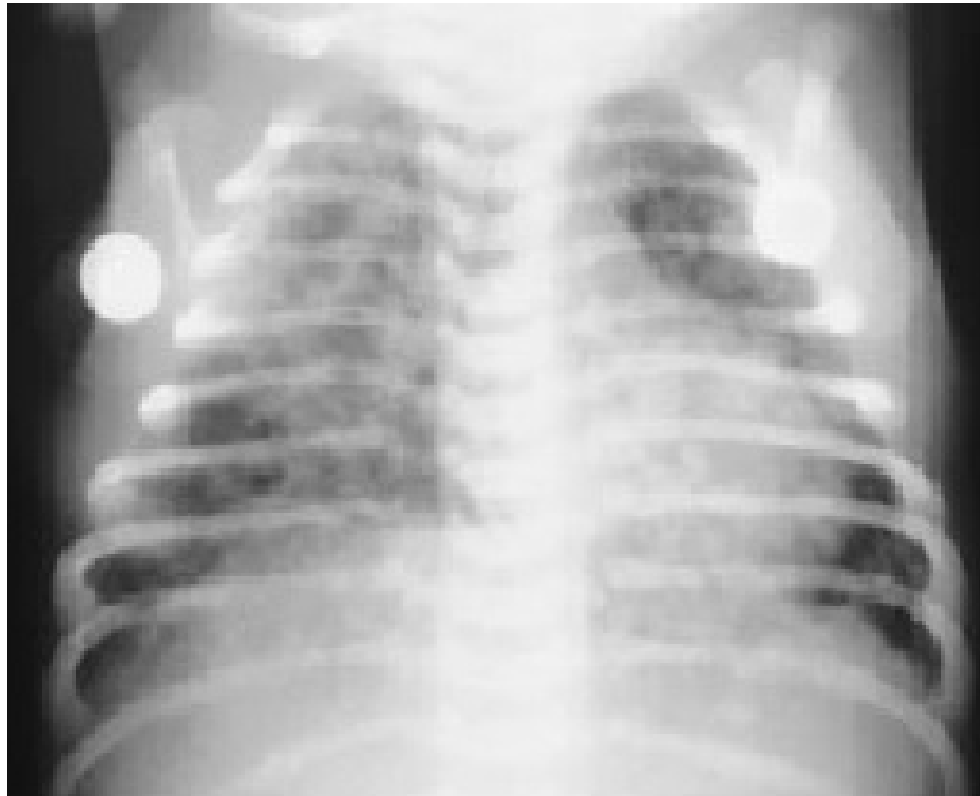


Staph Pneumonia

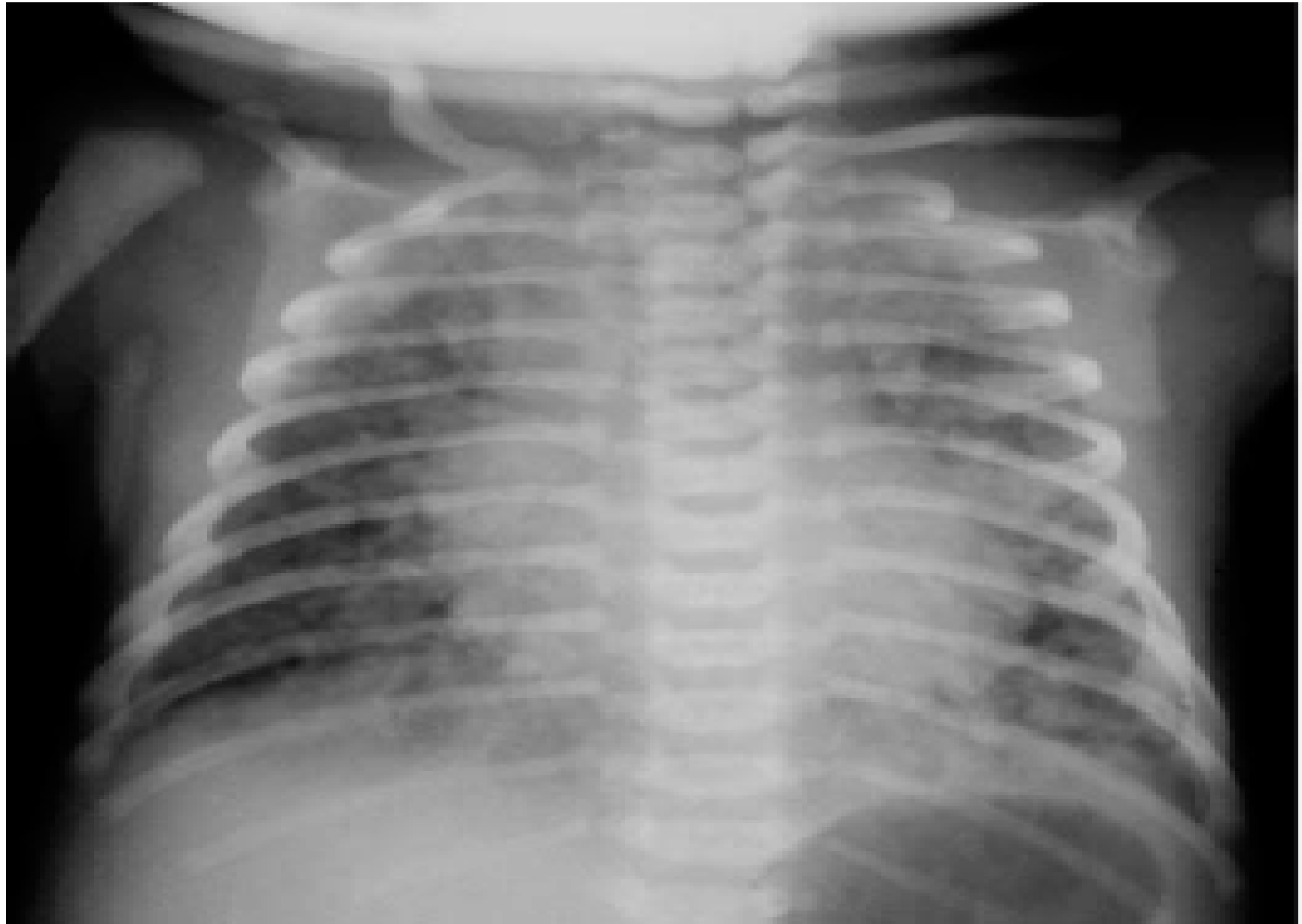


**Post-term baby, delivered by CS due to fetal distress→ meconium stained amniotic fluid & meconium staining of the whole body (no neonatologist attended the delivery).
The baby developed RD soon after birth.**

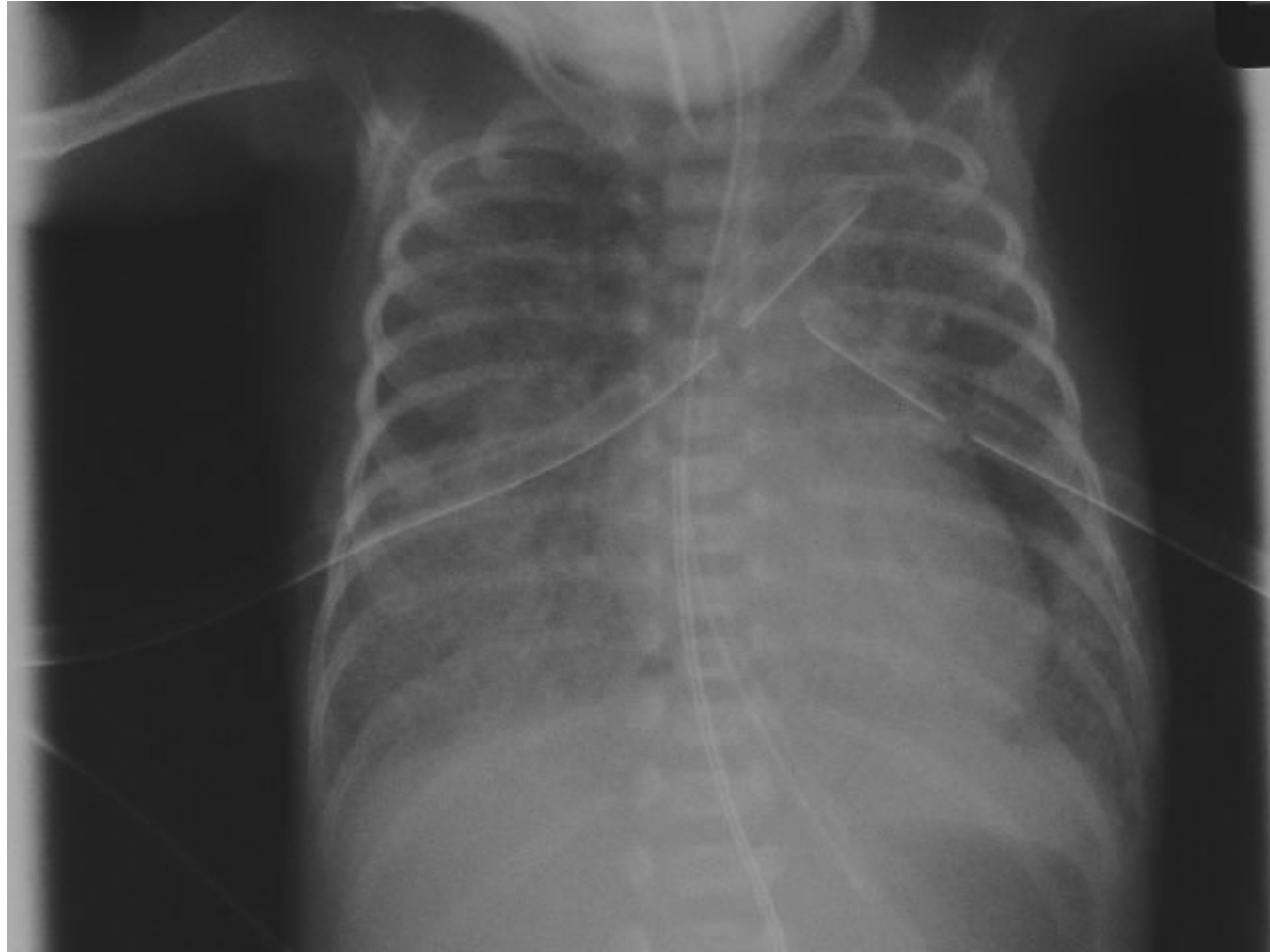
Meconium Aspiration Syndrome



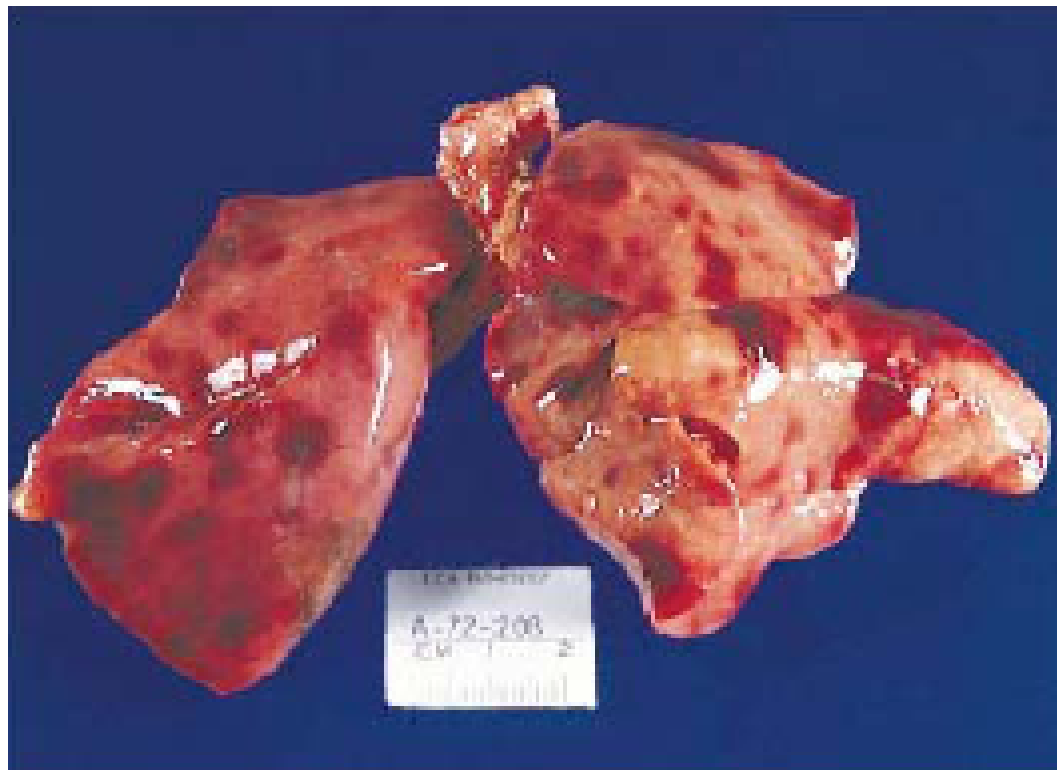




**Preterm baby 30 wks GA → severe RDS →
ET intubated & ventilated → blood tinged
fluid from ETT → sudden onset of
catastrophic collapse → ↑ hemorrhage from
ETT → required ↑ing ventilatory support.**



Pulmonary Hemorrhage

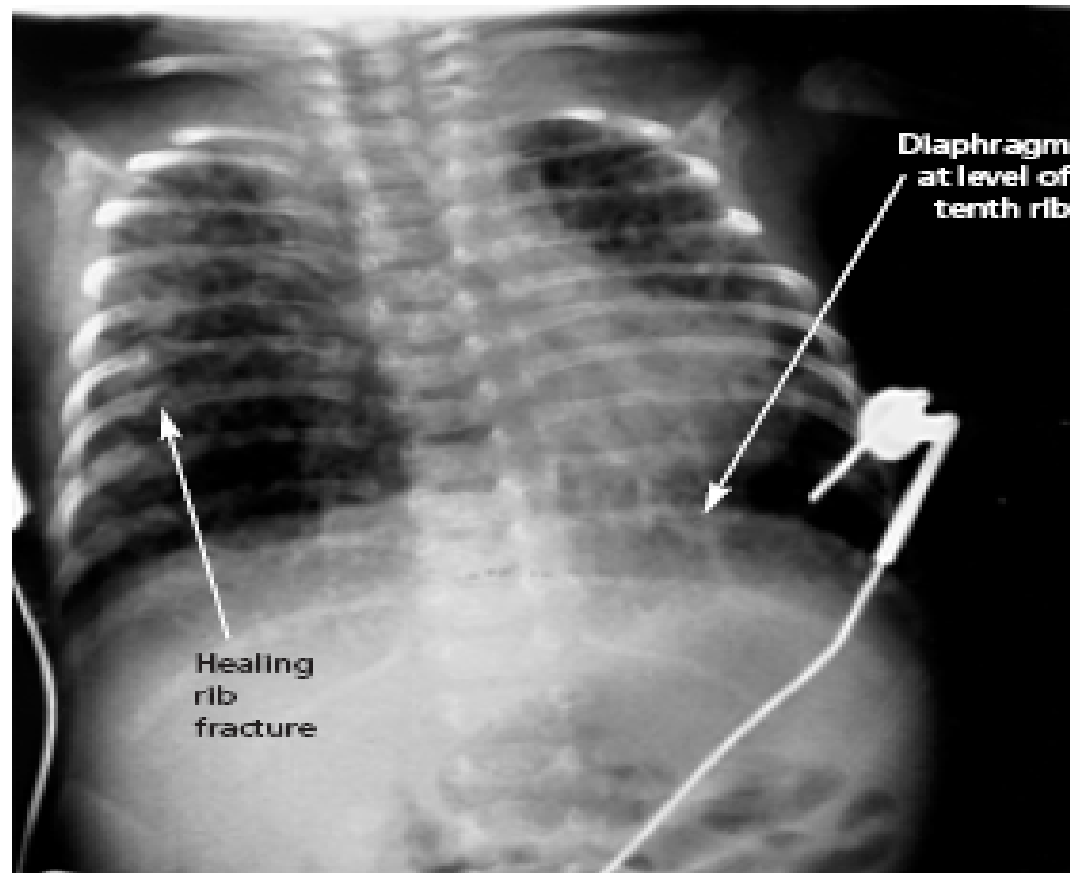


**Six months old baby who had severe RDS
requiring ventilation for one month, still on
supplemental O₂.**

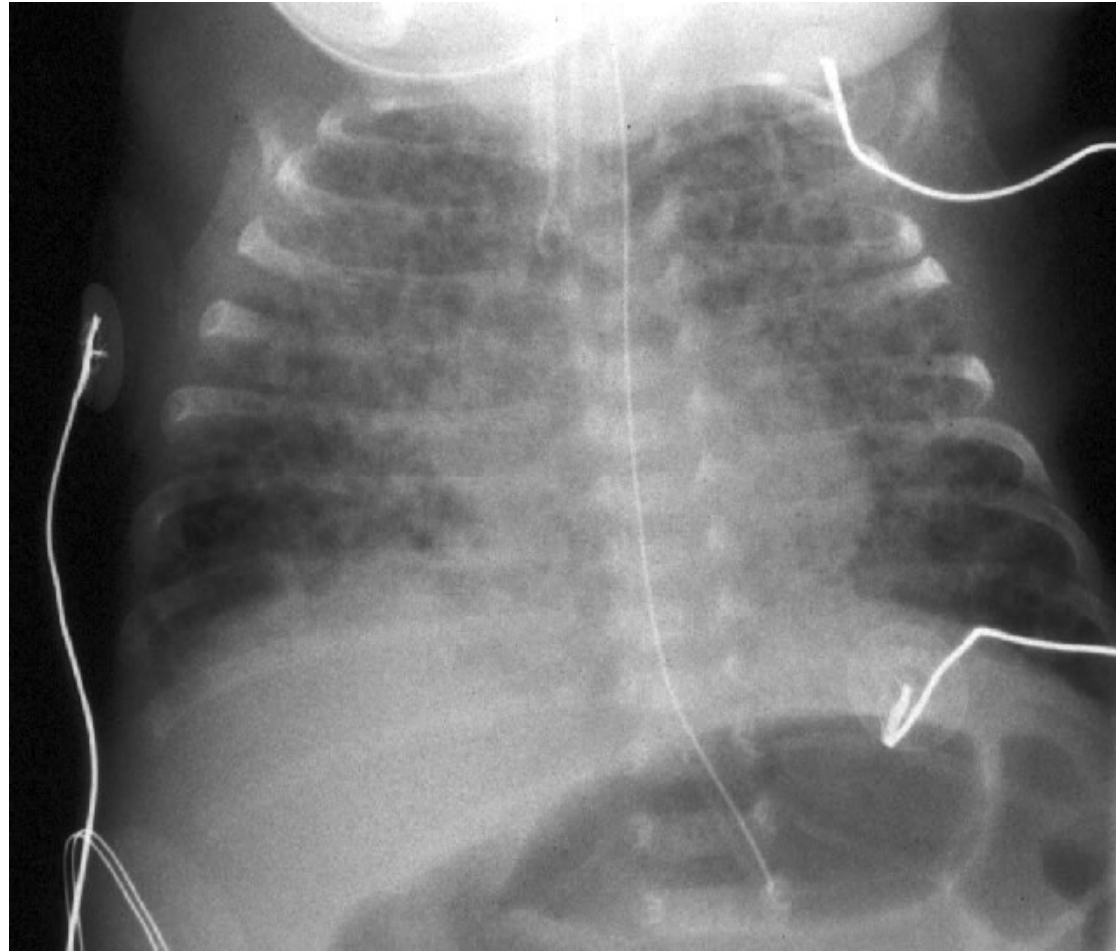
BPD



the chest radiograph becomes diffusely hazy.
Lung volumes are normal or low.
areas of atelectasis that alternate with areas of gas trapping,



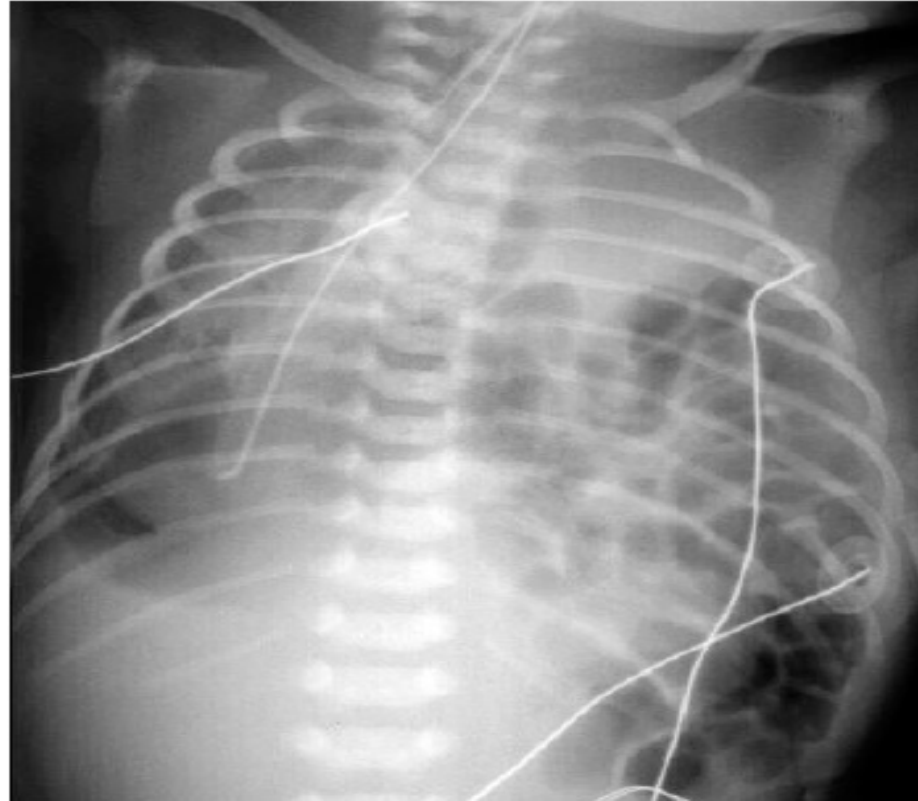




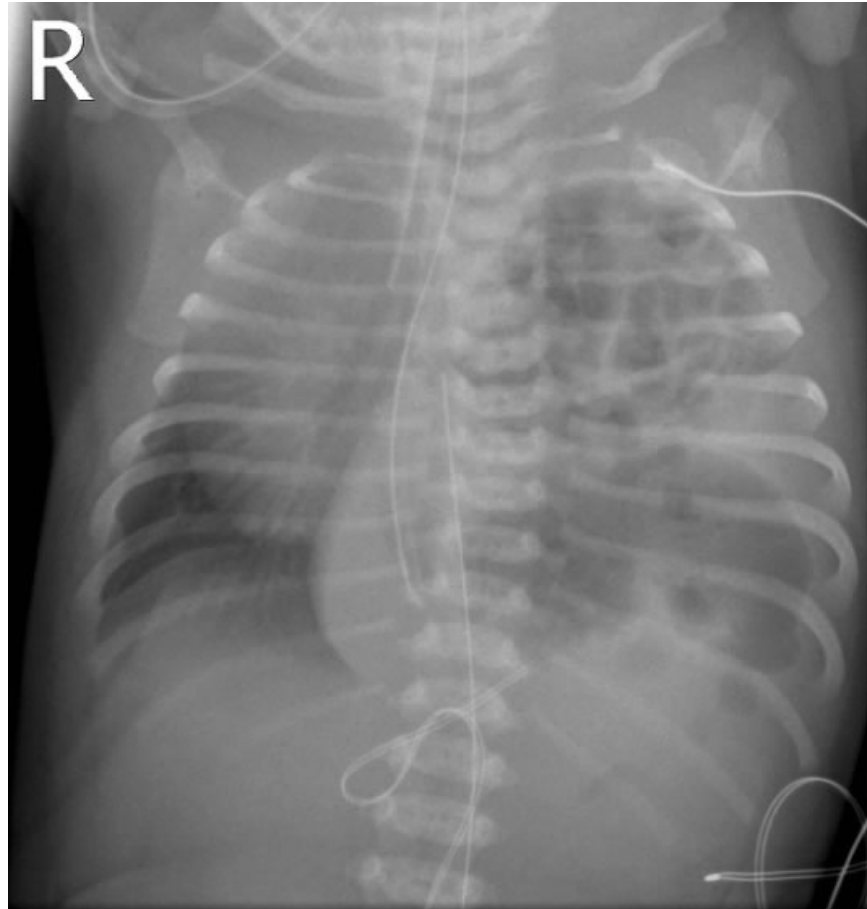
Full-term baby developed severe cyanosis & RD after birth.

It had scaphoid abdomen, ↓ breath sounds on Lt hemithorax.

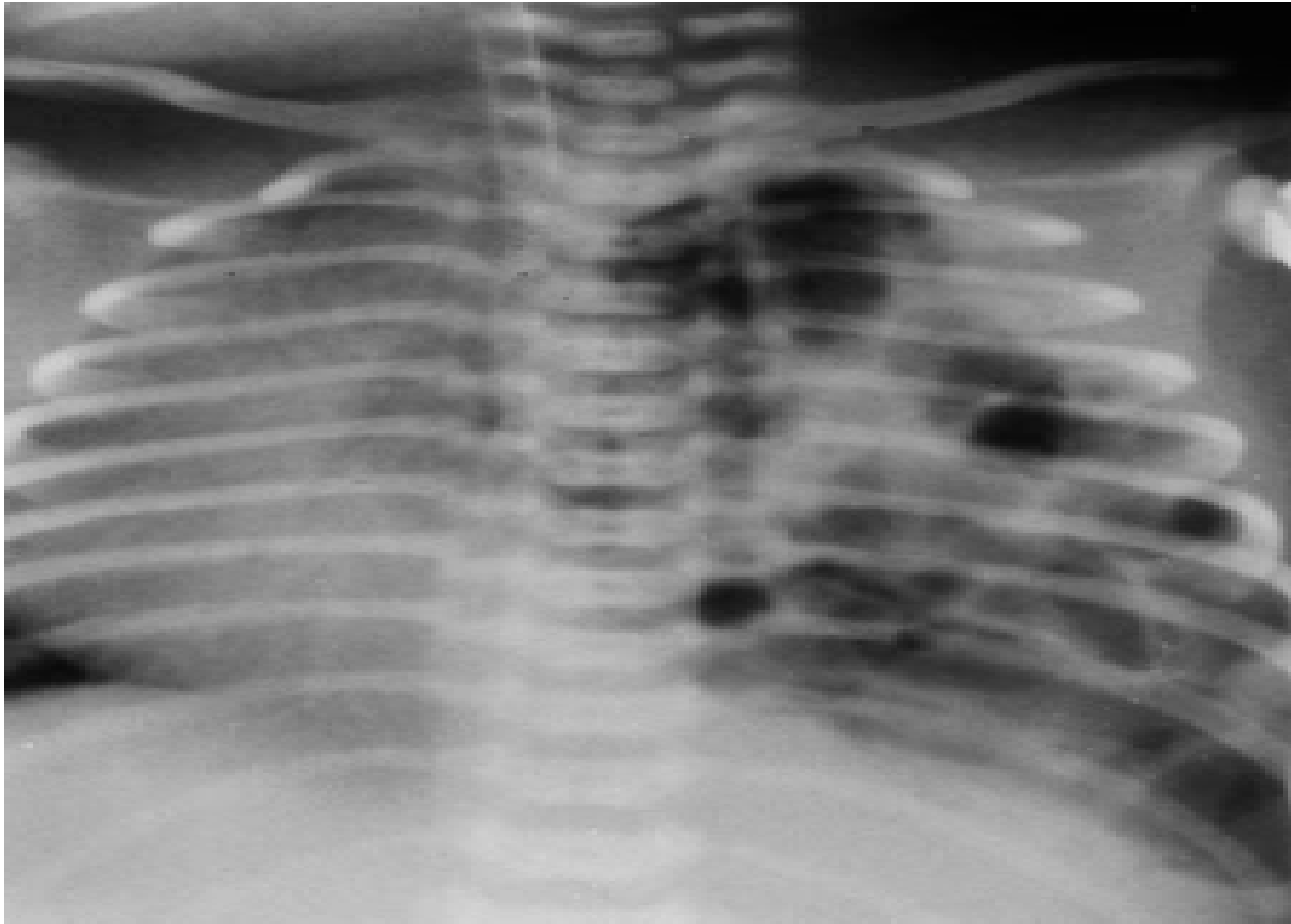
Congenital Diaphragmatic Hernia



CDH occurs because of a developmental defect in the formation of the diaphragm between weeks 8 and 10 of gestation.

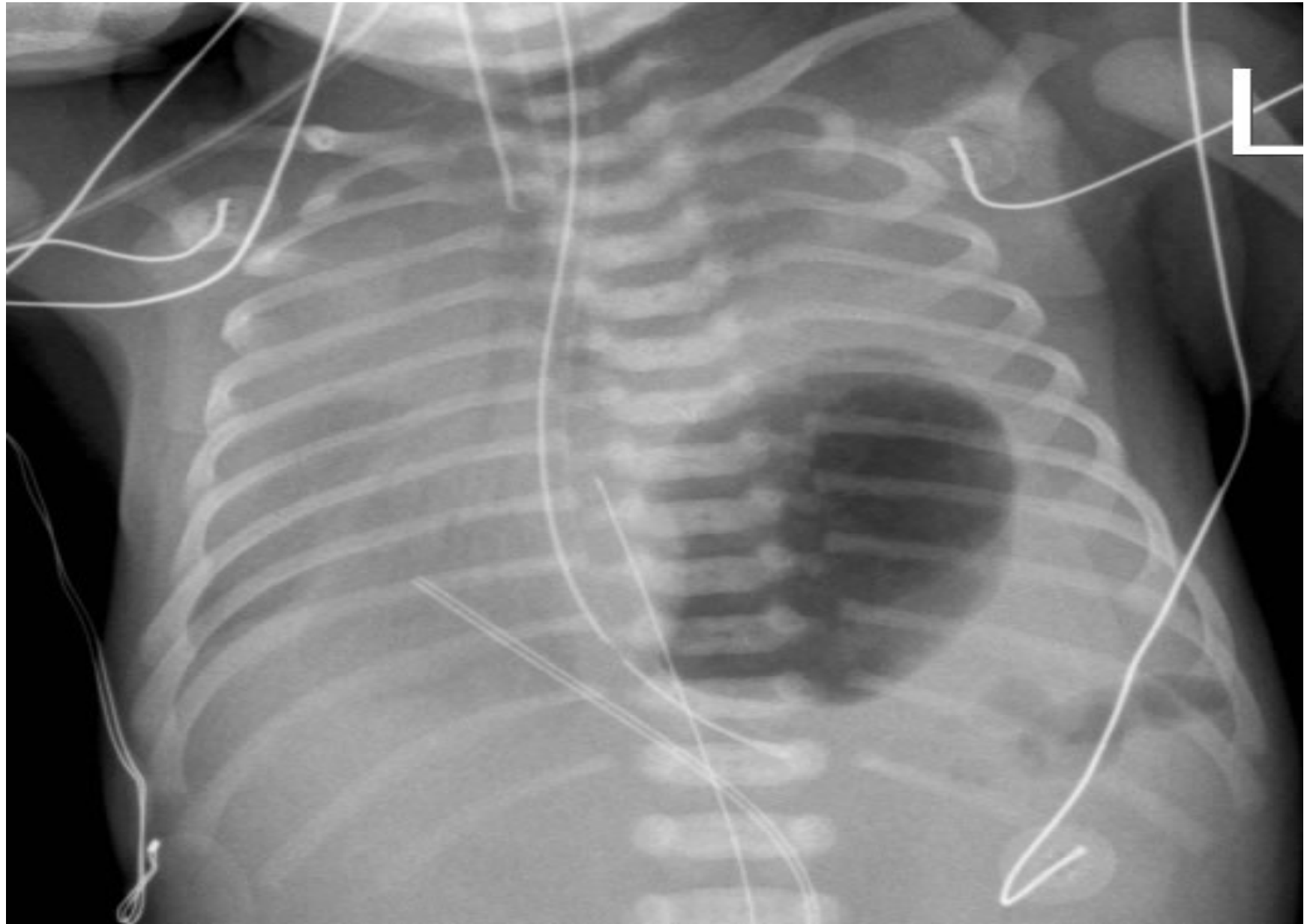


85 % of CDH occur on the left side,
13% are rightsided,
2% are bilateral. Right-sided defects are associated
the presence of the liver in the chest

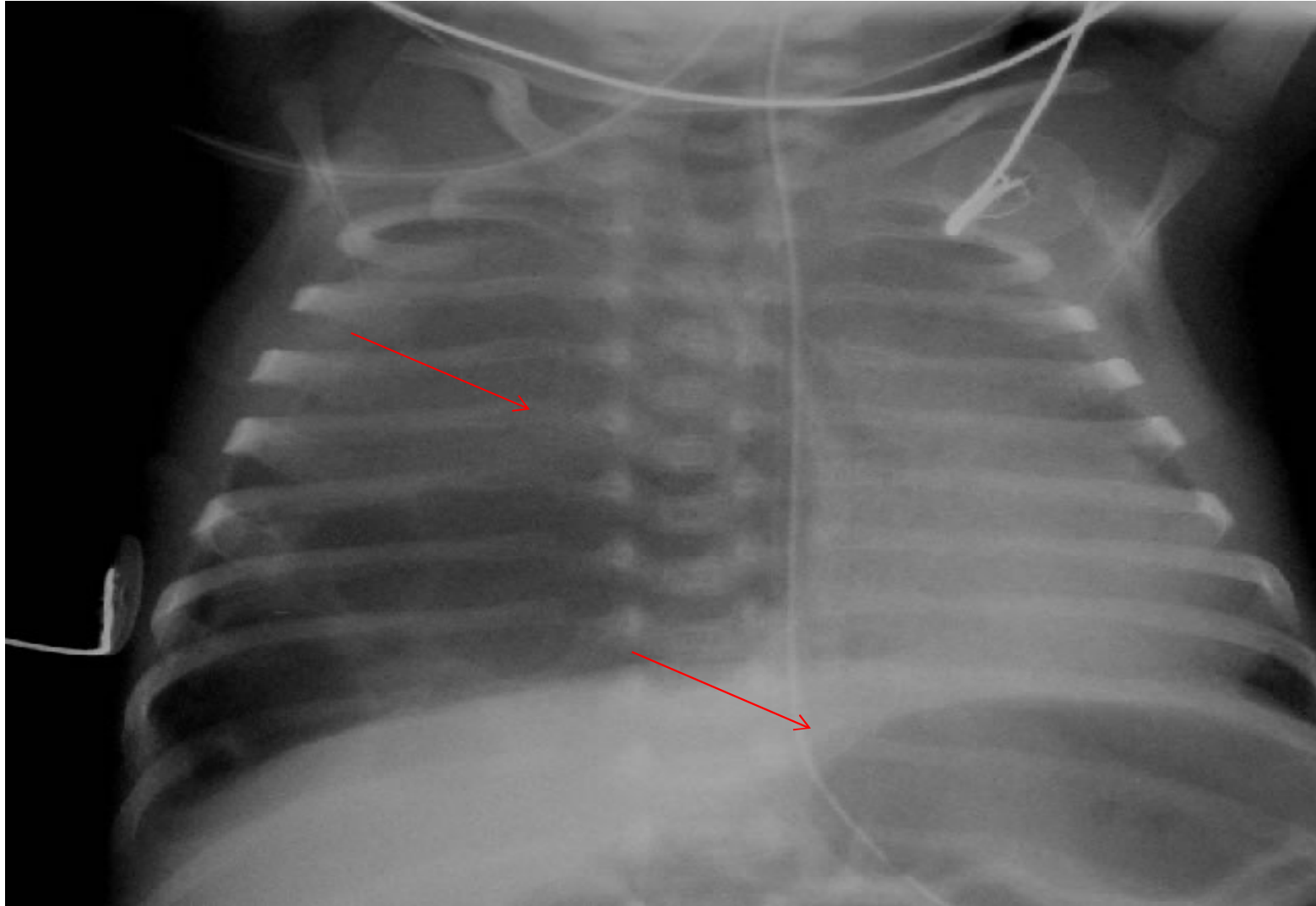


the most common Bochdalek type, resulting from a posterolateral defect;
the Morgagni type, resulting from an anterior defect;
and the pars sternalis type, which occurs due to a central diaphragmatic defect.

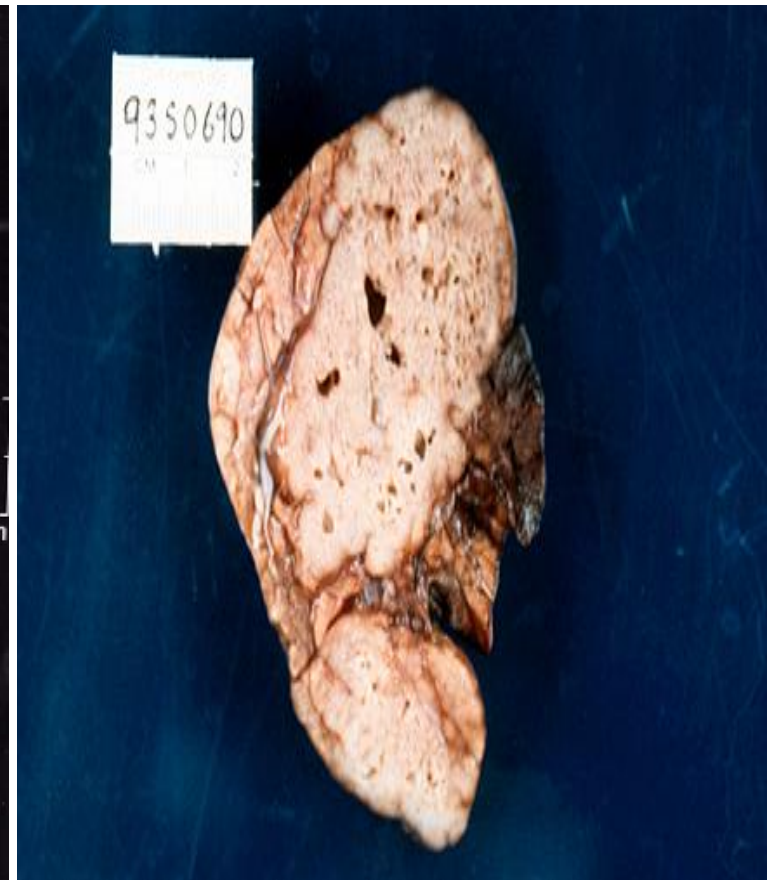
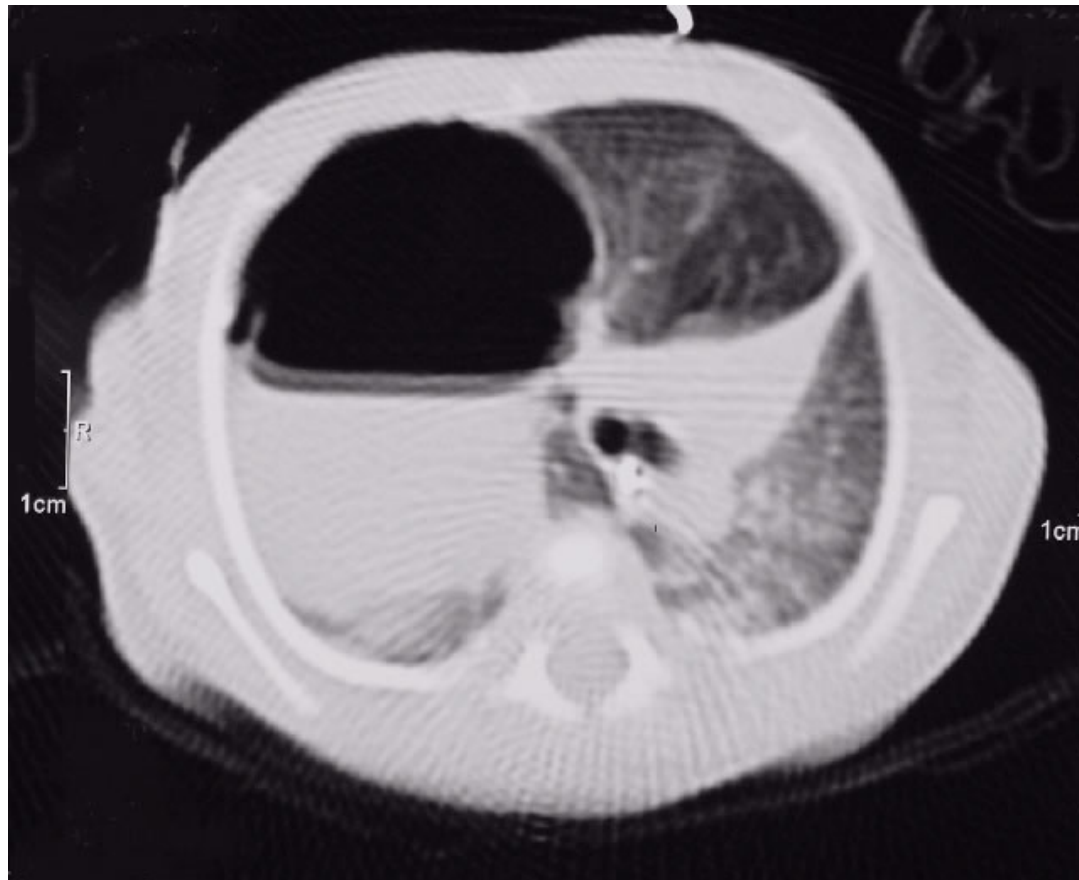




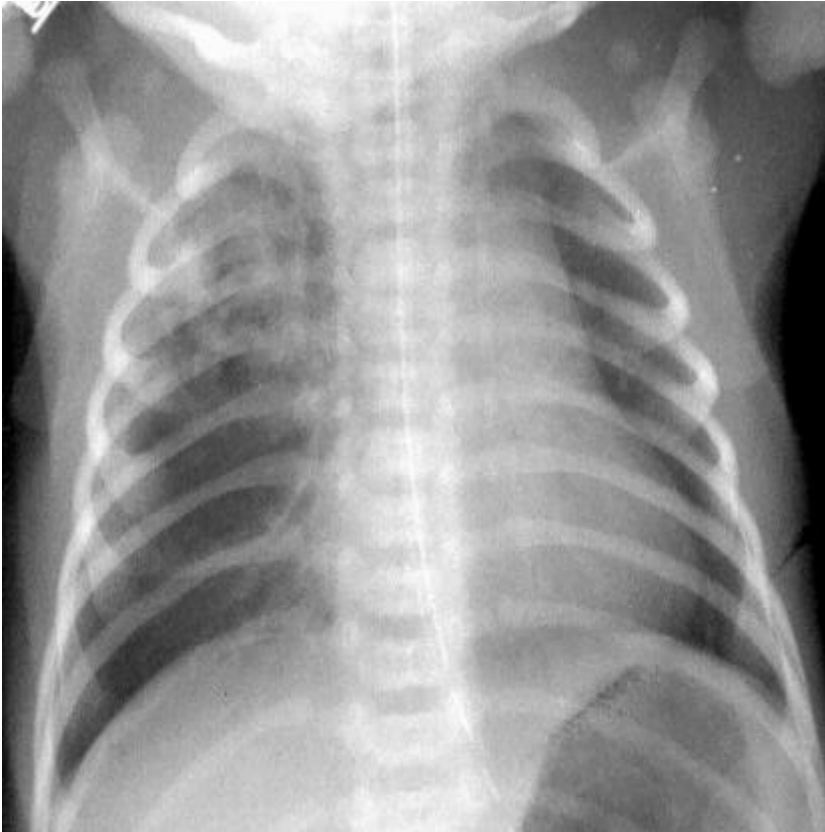




Cystic Adenomatoid Malformation

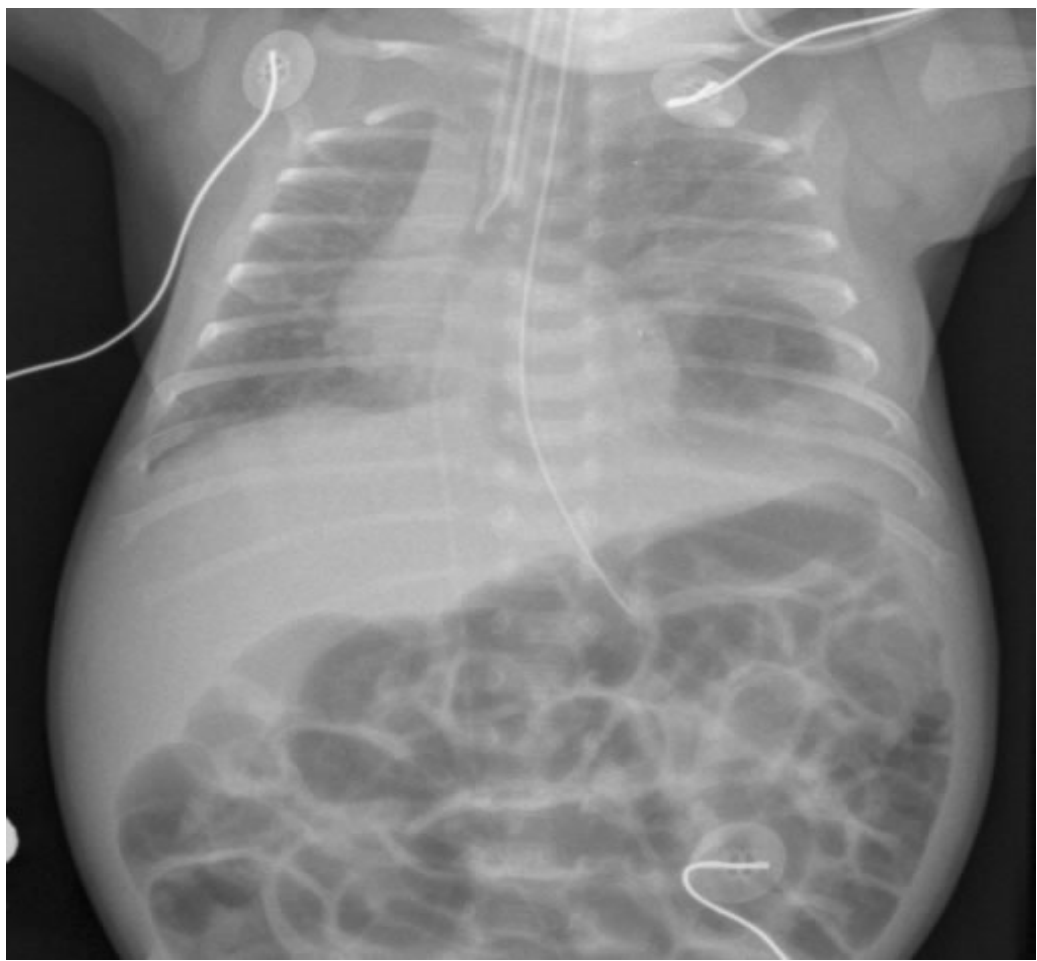


Congenital pulmonary airway malformation (CPAM)
abnormalities of branching morphogenesis of the lung
BPS (no connection to the tracheobronchial tree anomalous systemic artery)

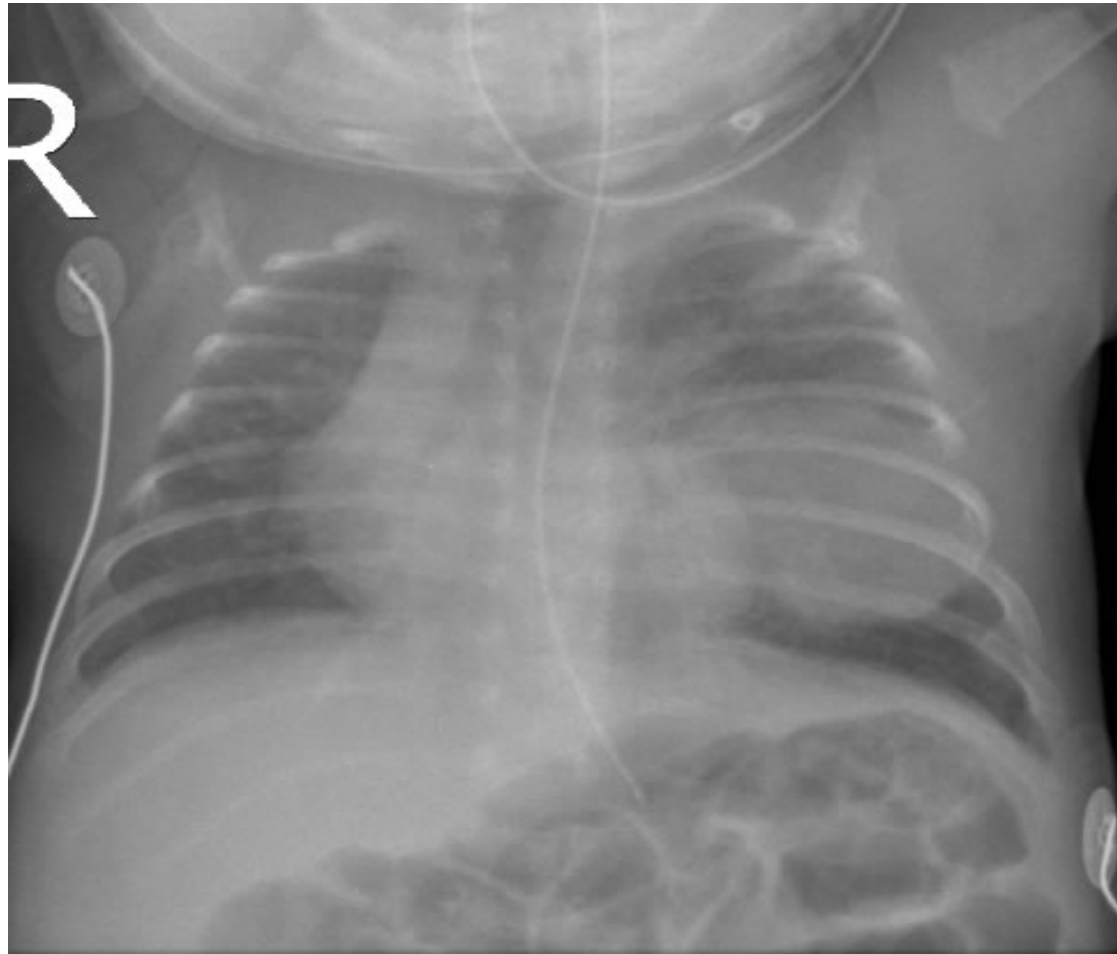


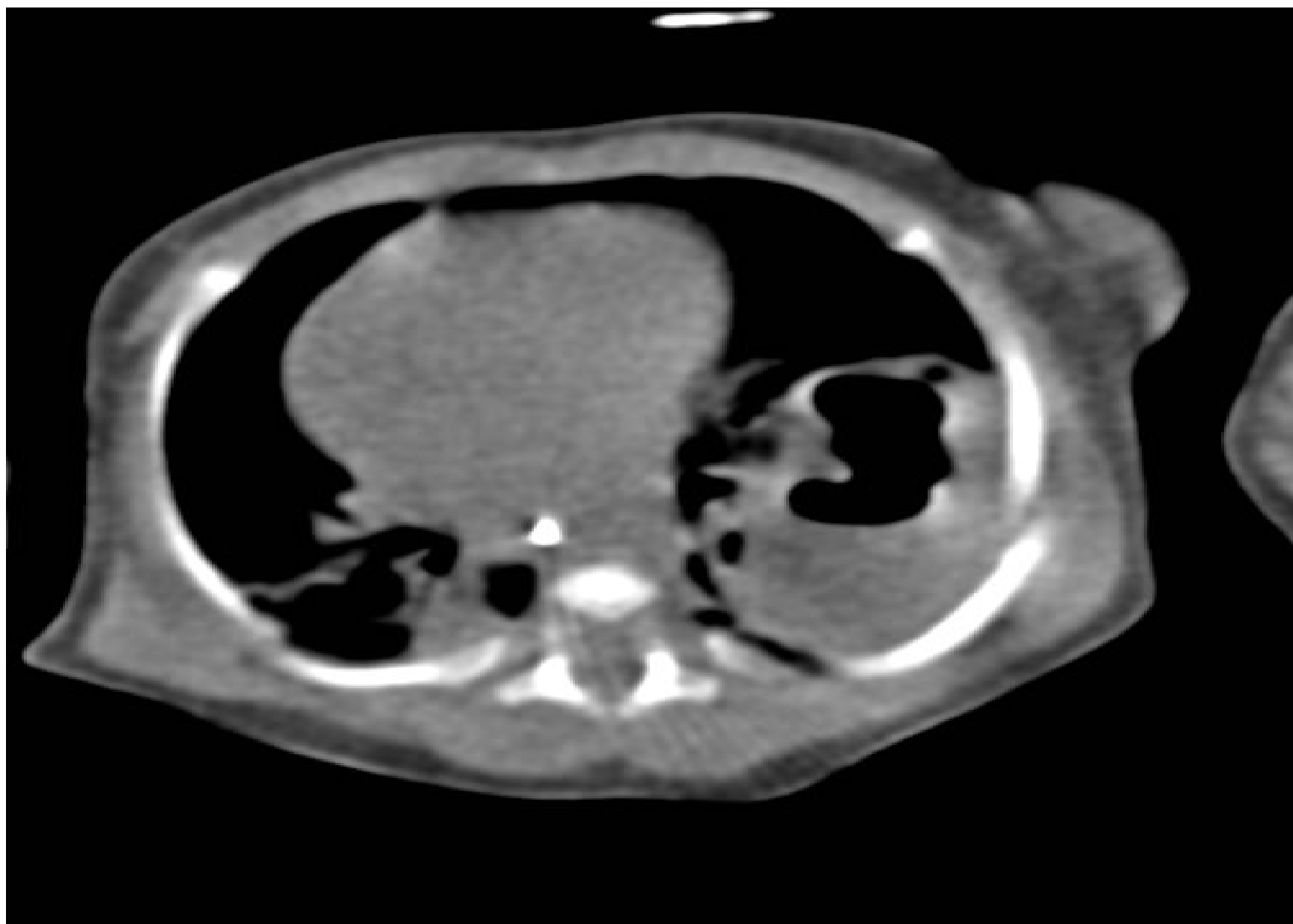
Multiple small cysts are demonstrated in the apex of the right upper lobe.

A baby neonate who had recently an episode of pneumonia in NICU.



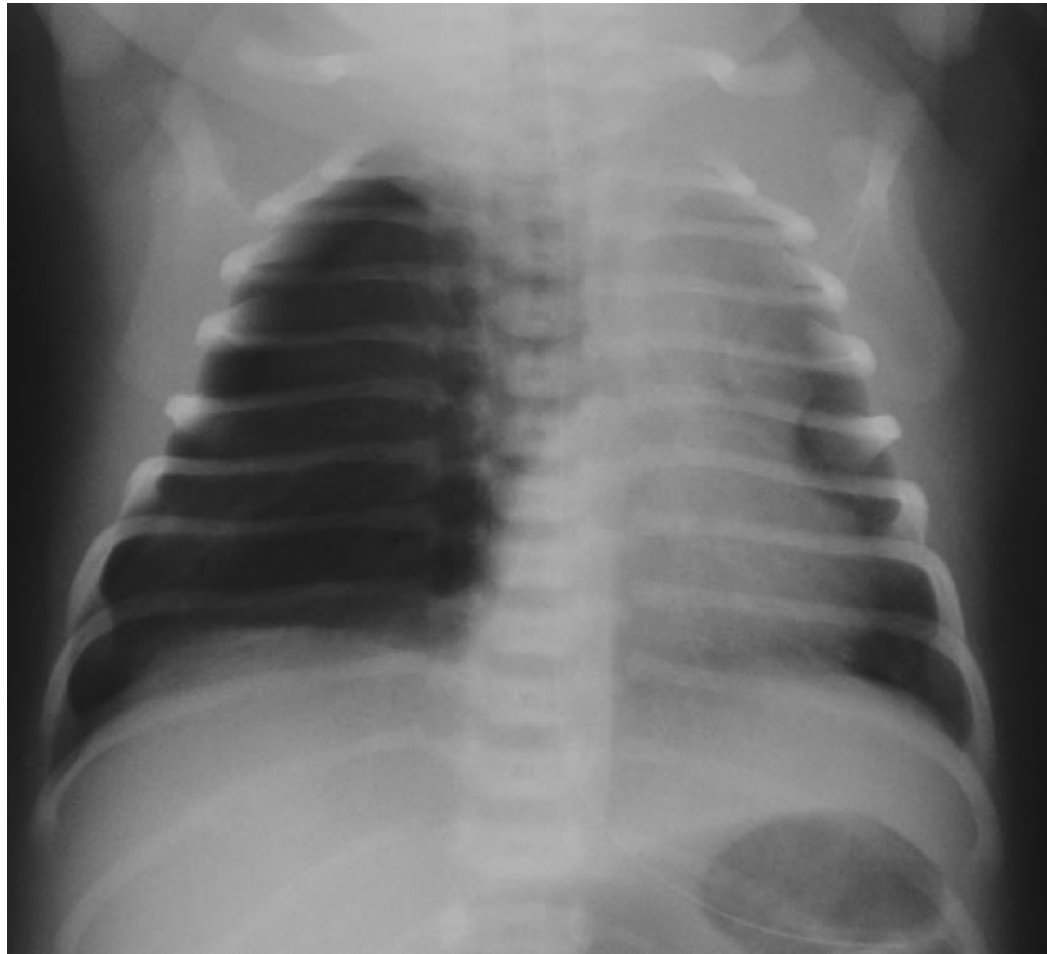
Lung Abscess

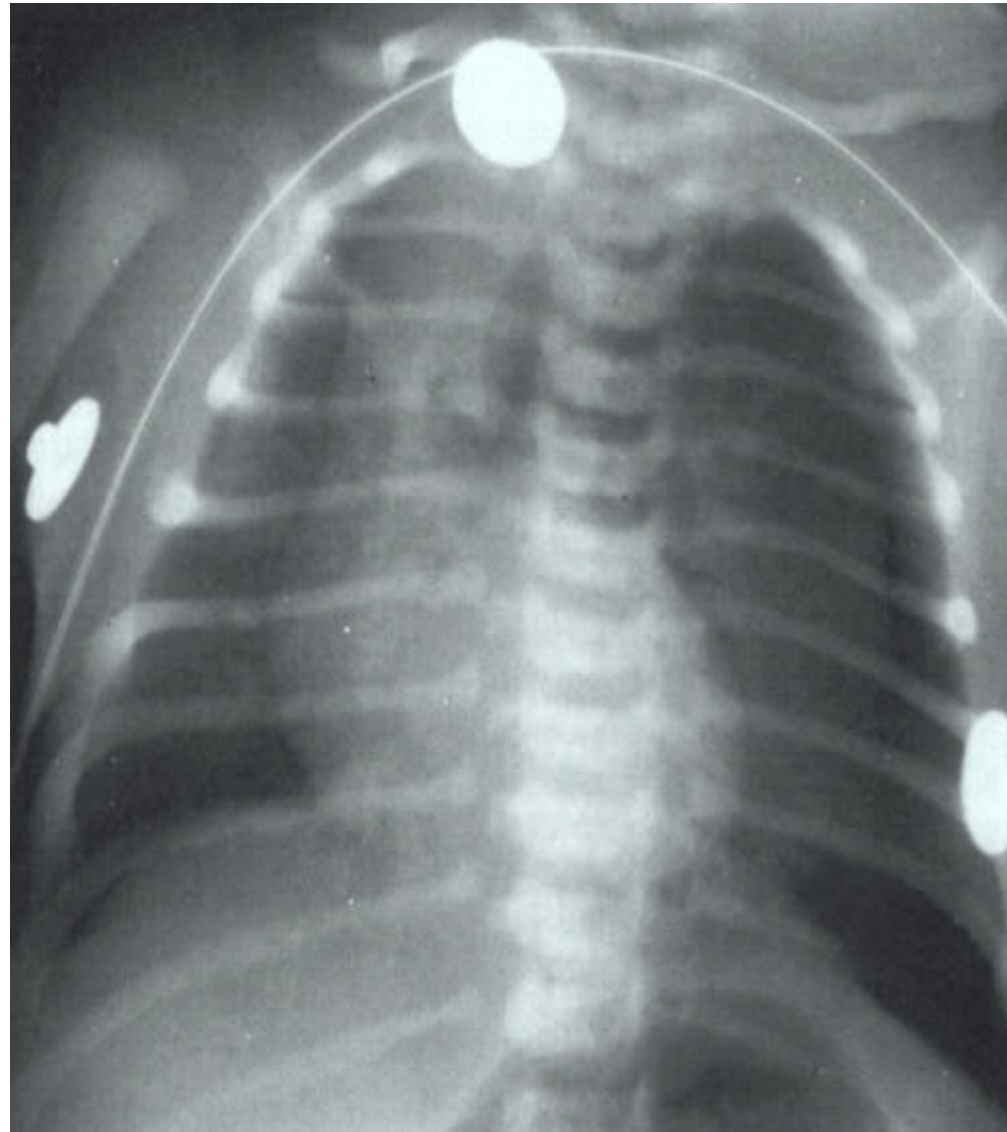


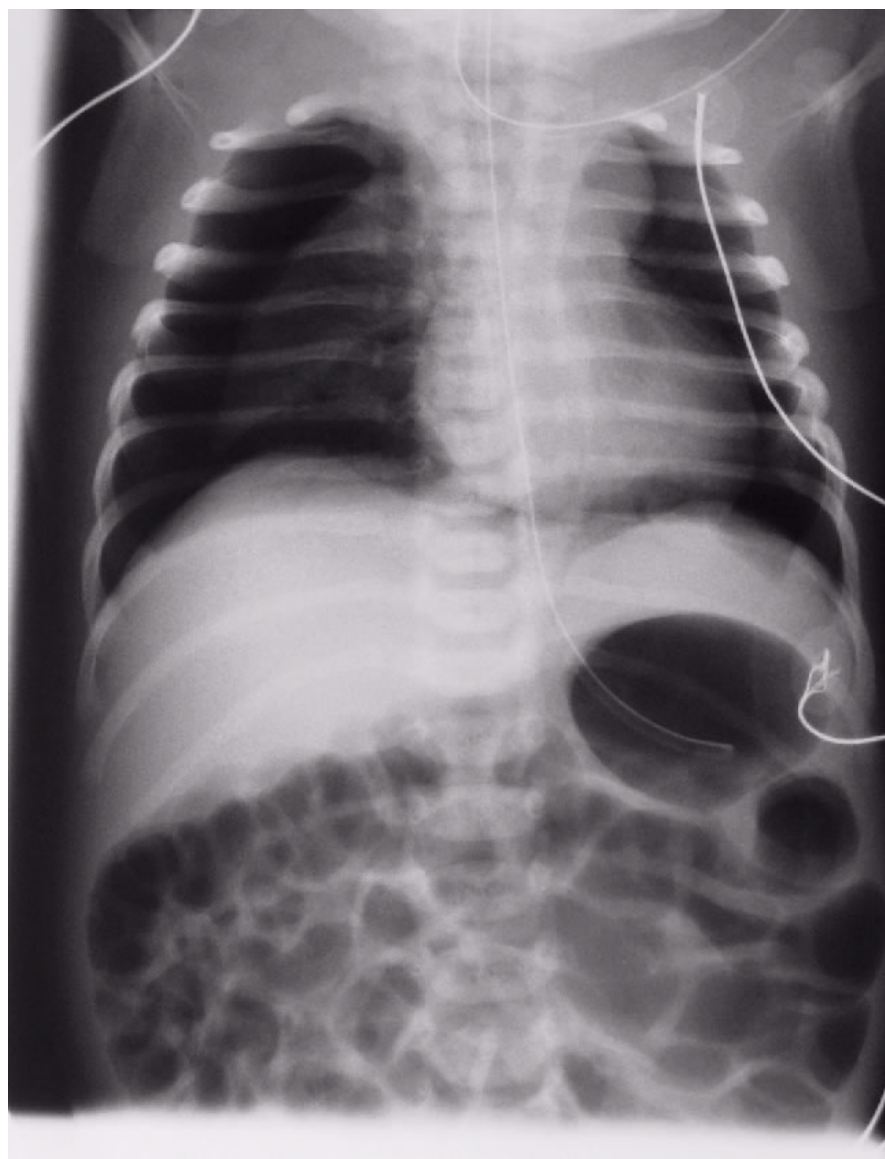


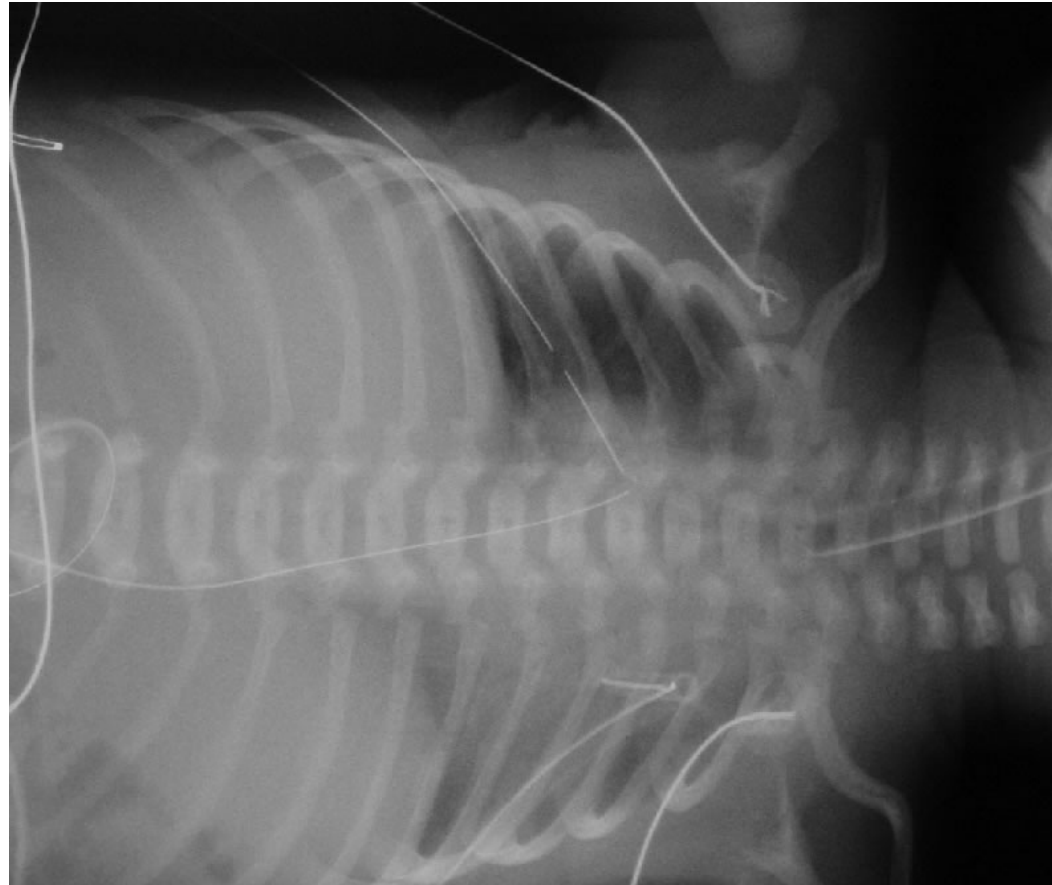
**A neonate with RDS → mechanical
ventillated with ↑ing pressures→ sudden
cyanosis, respiratory distress, bradycardia,
hypotension.**

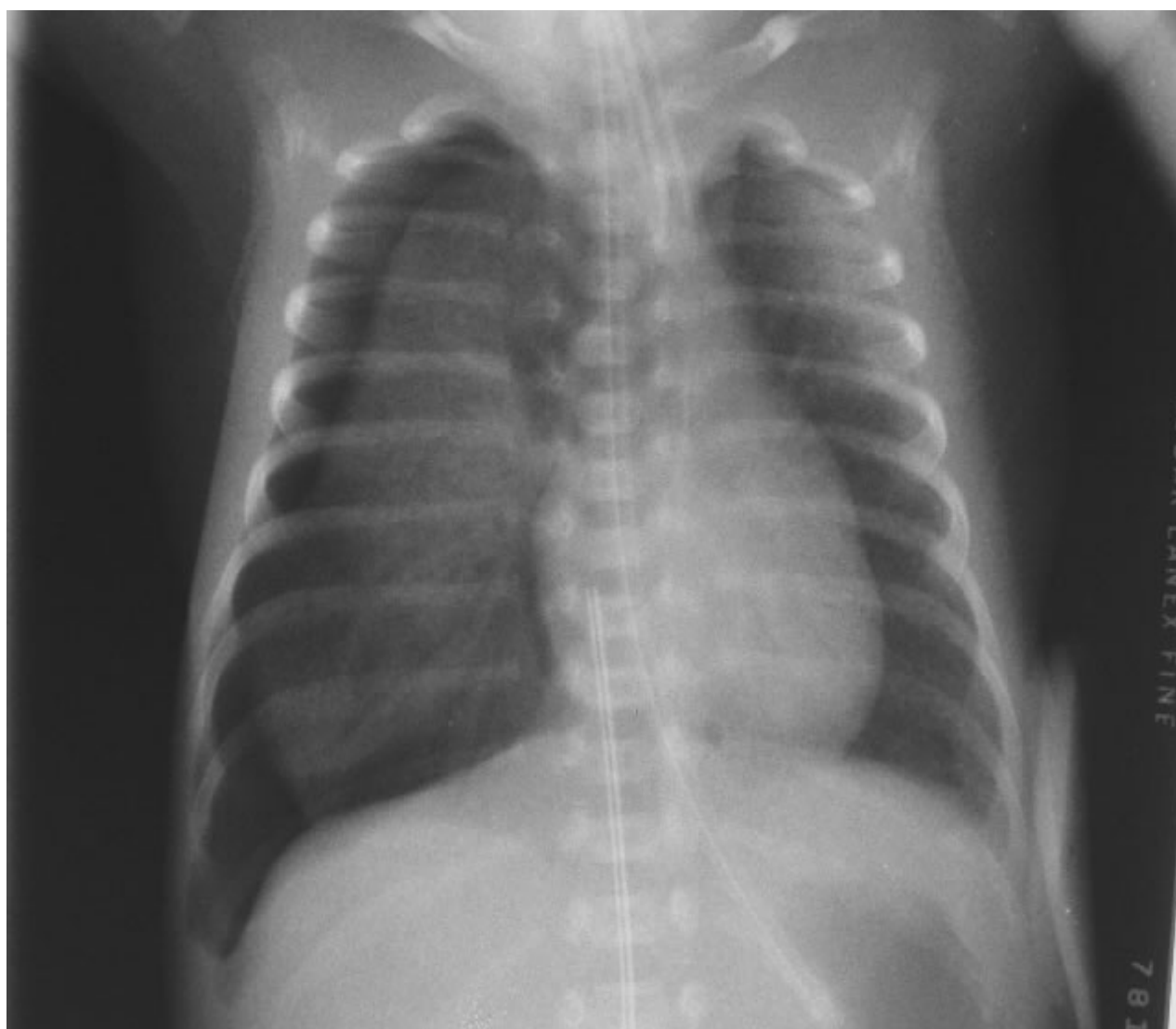
Pneumothorax

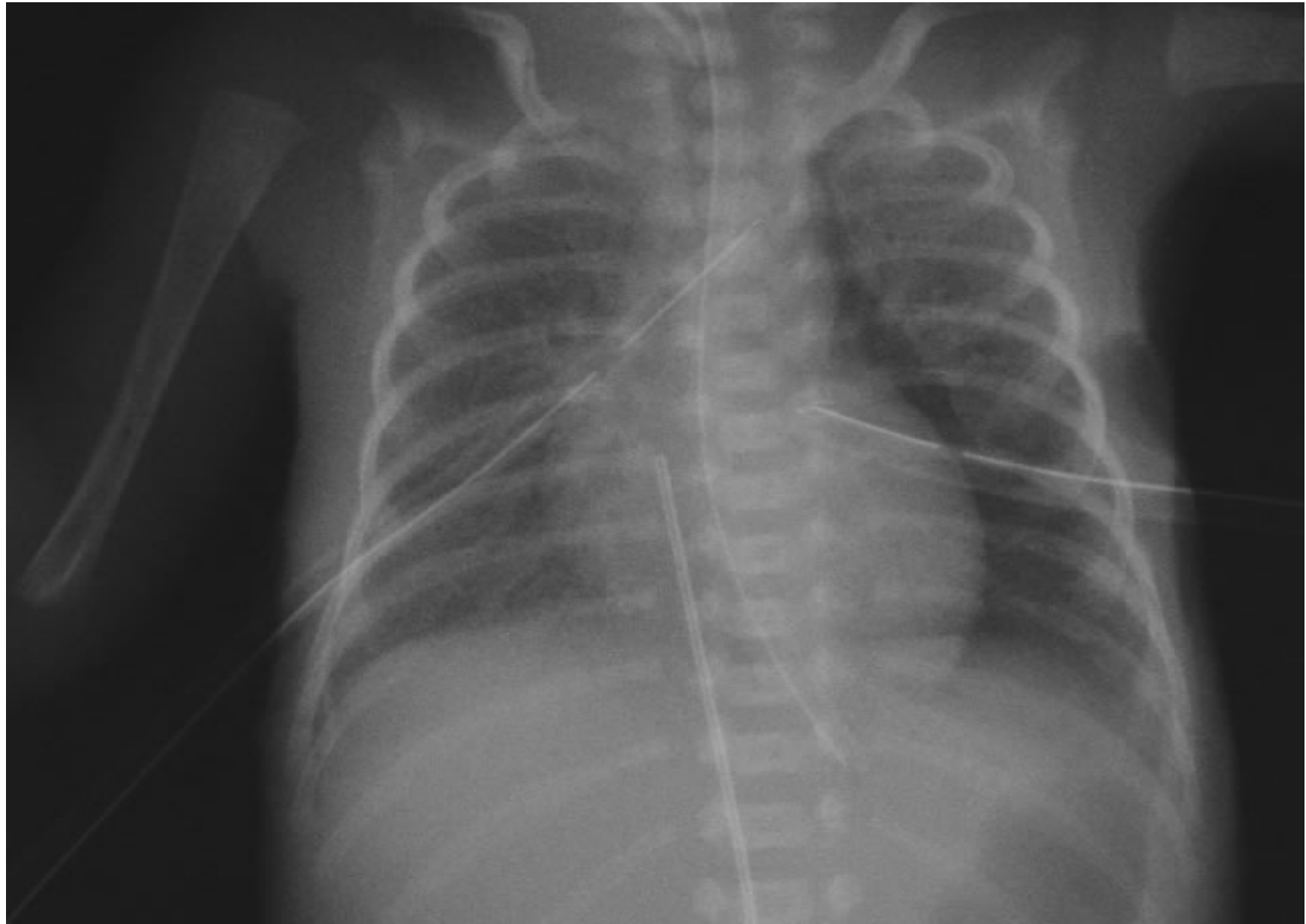


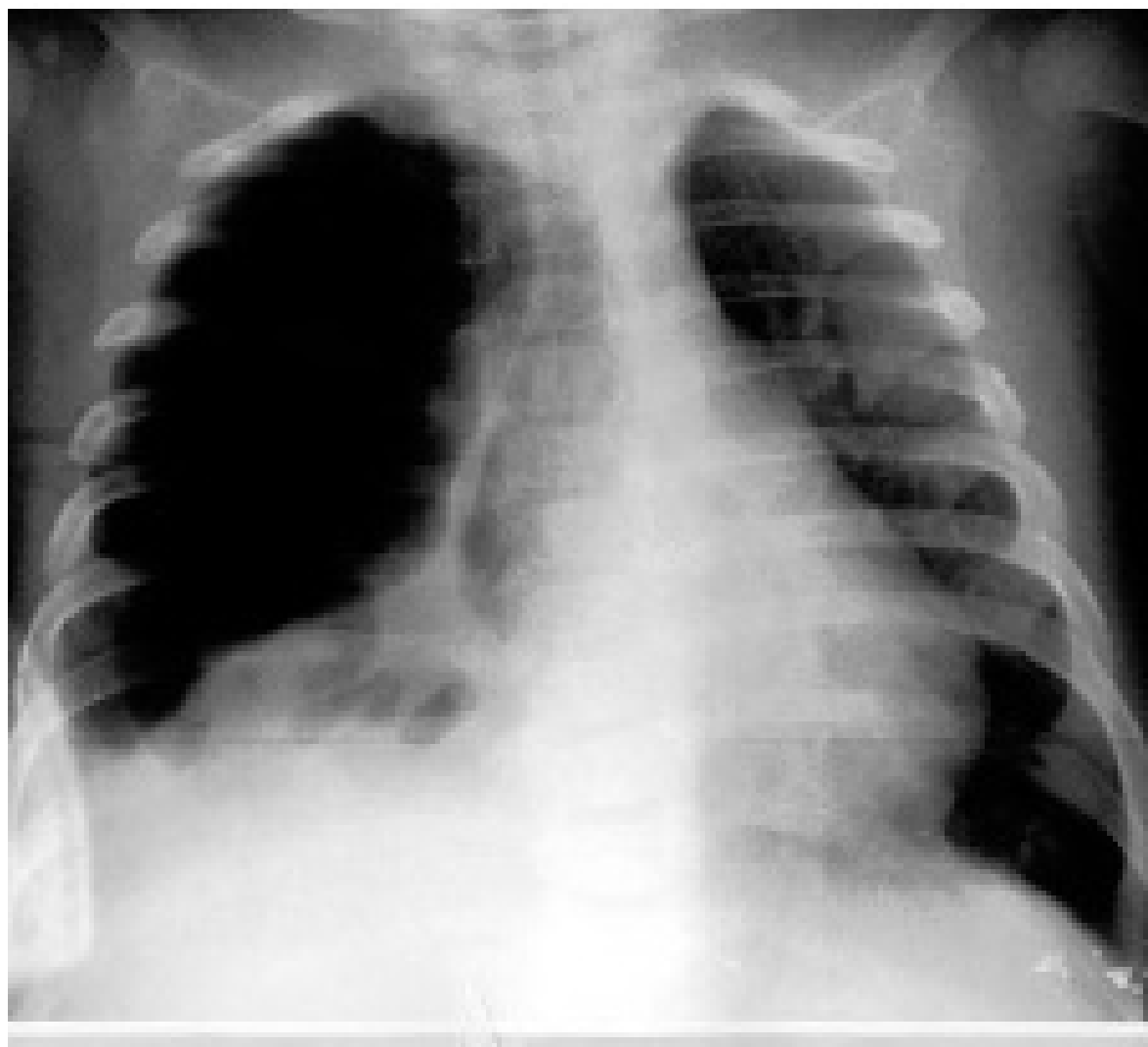














Pneumomediastinum

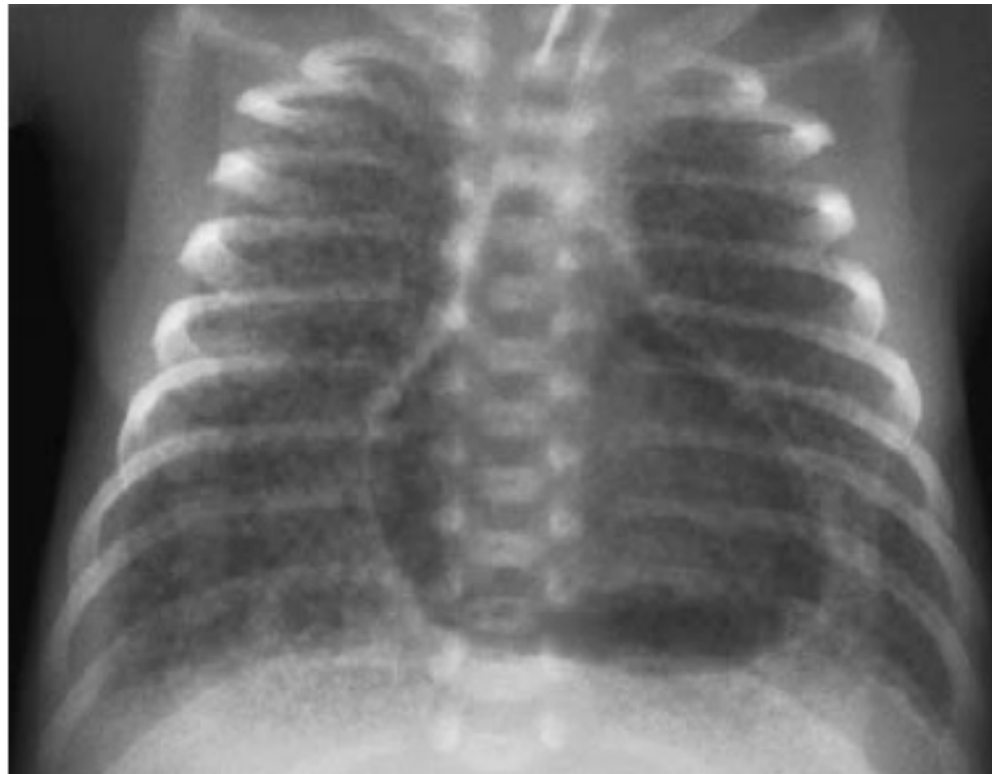


Air in the mediastinum surrounds the thymus and lifts it from the cardiac shadow, resulting in the characteristic "spinnaker sail" sign



**A neonate on mechanical ventilation →
sudden pallor, shock, hypotension.**

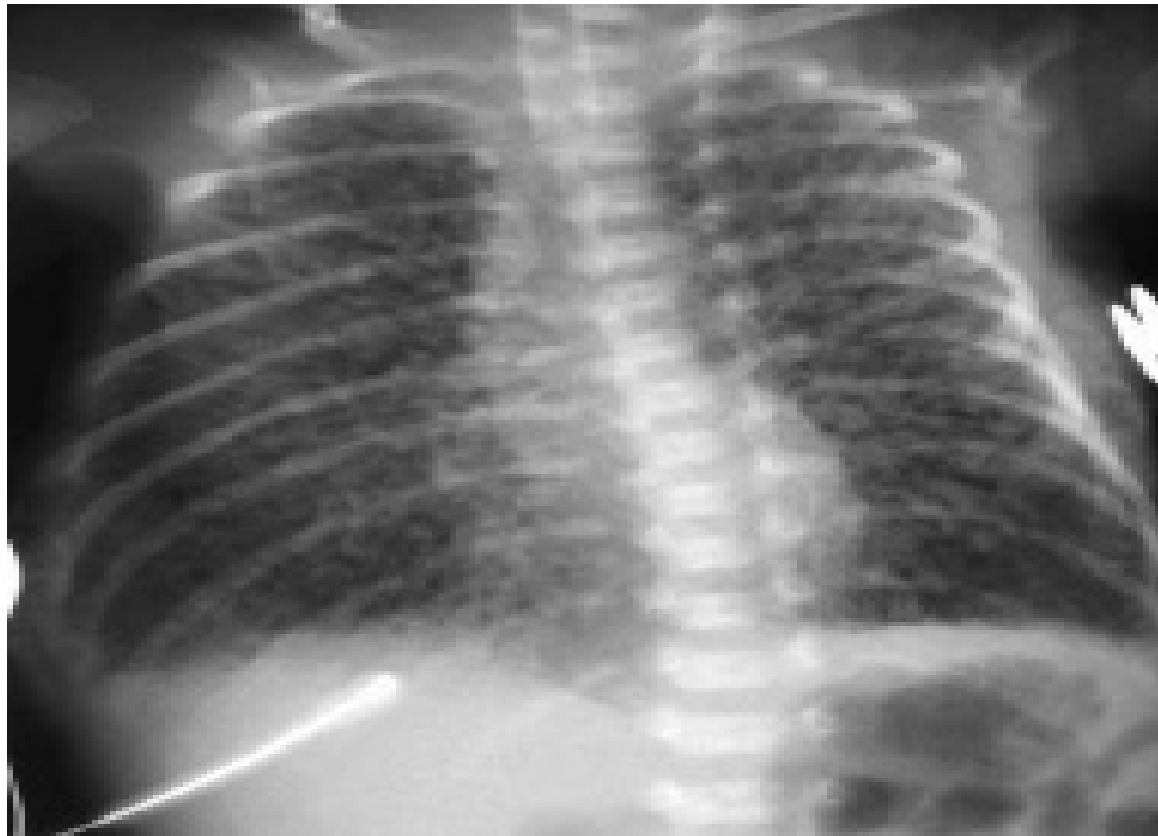
Pneumopericardium





**Six-day preterm on mechanical ventilation
with high pressures.**

Pulmonary Interstitial emphysema



Diaphragmatic paralysis



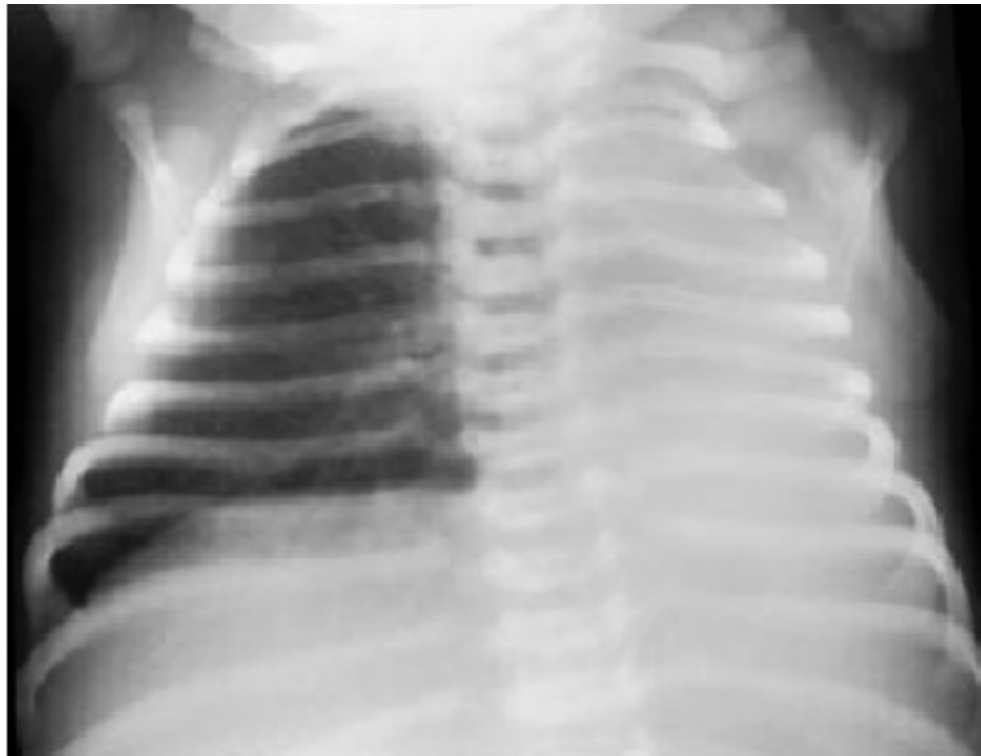


Bilateral Lung Hypoplasia

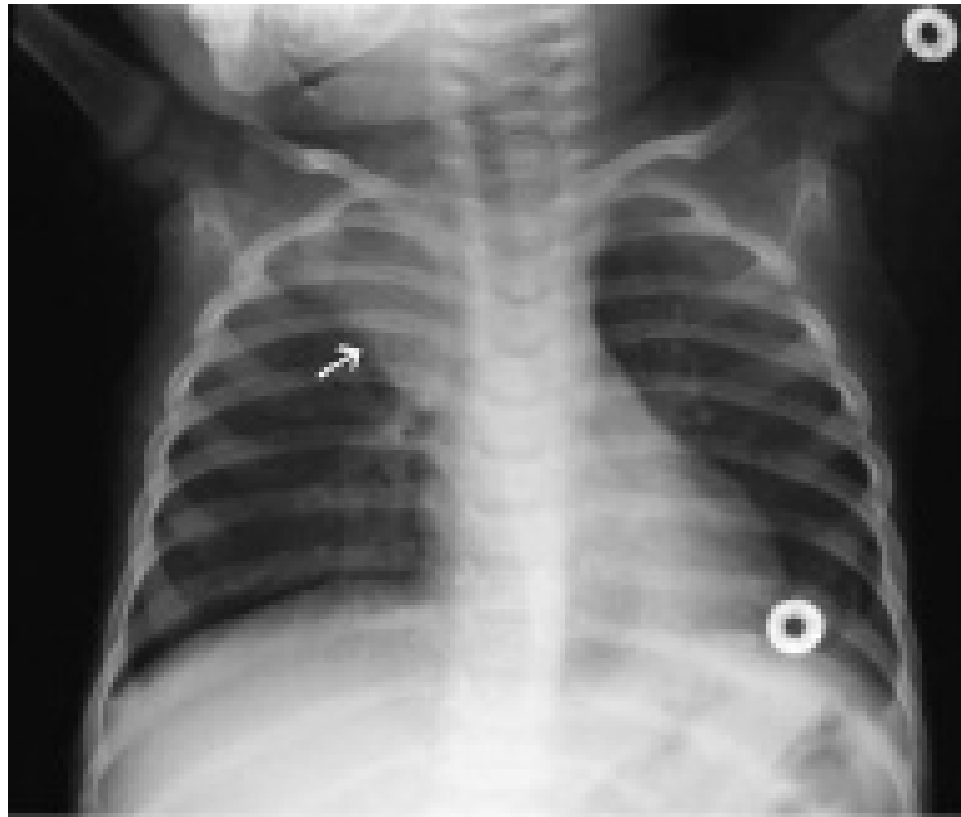


Small chest
Ribs are thin and slope downward steeply

Unilateral Lung Hypoplasia

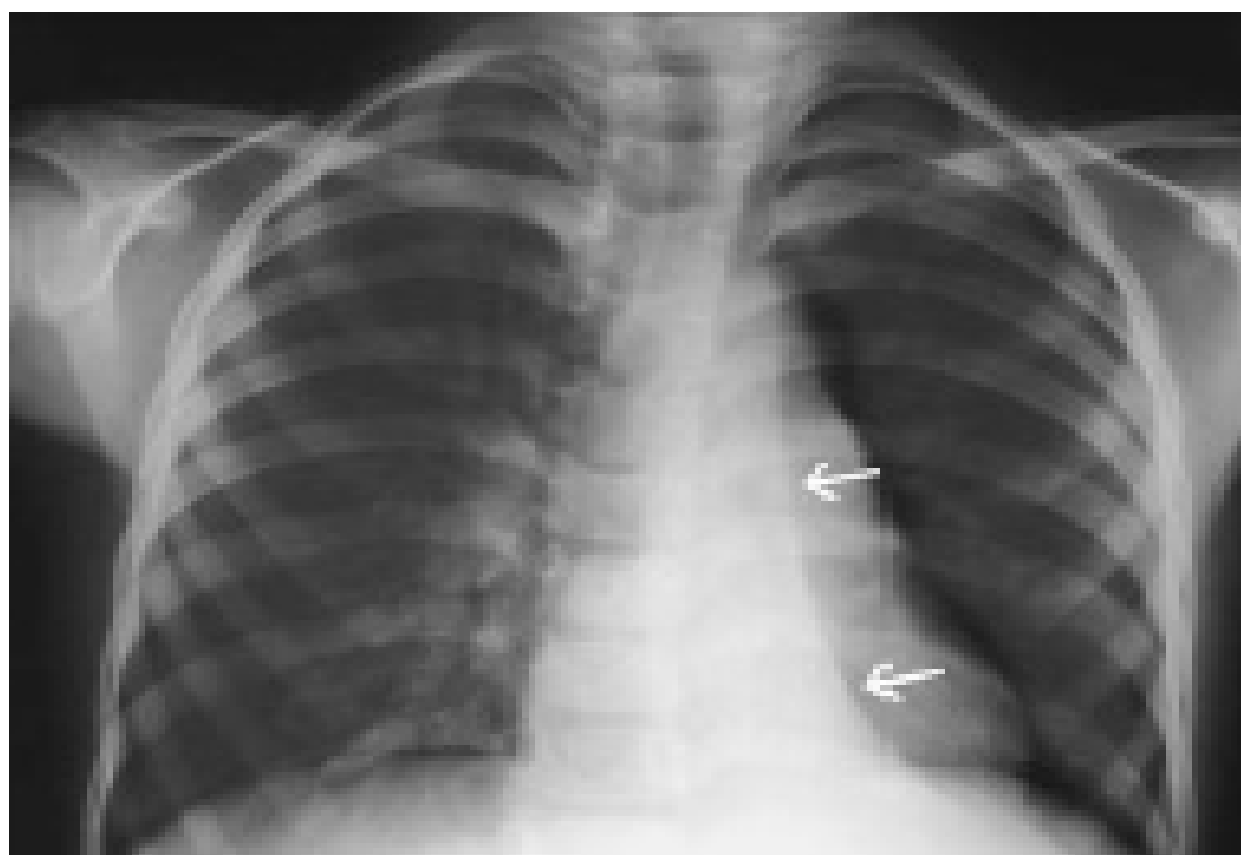


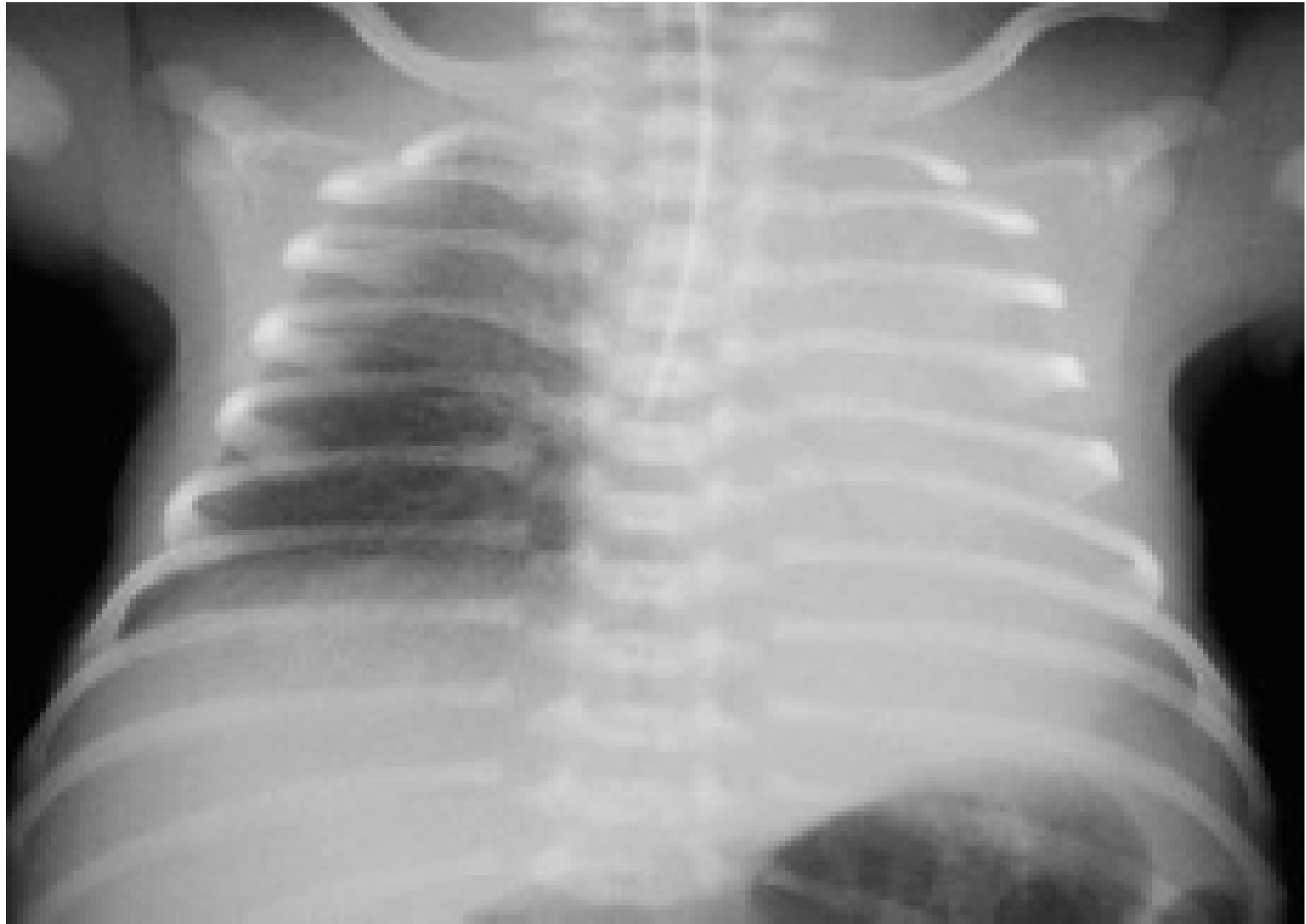
Lung Collapse

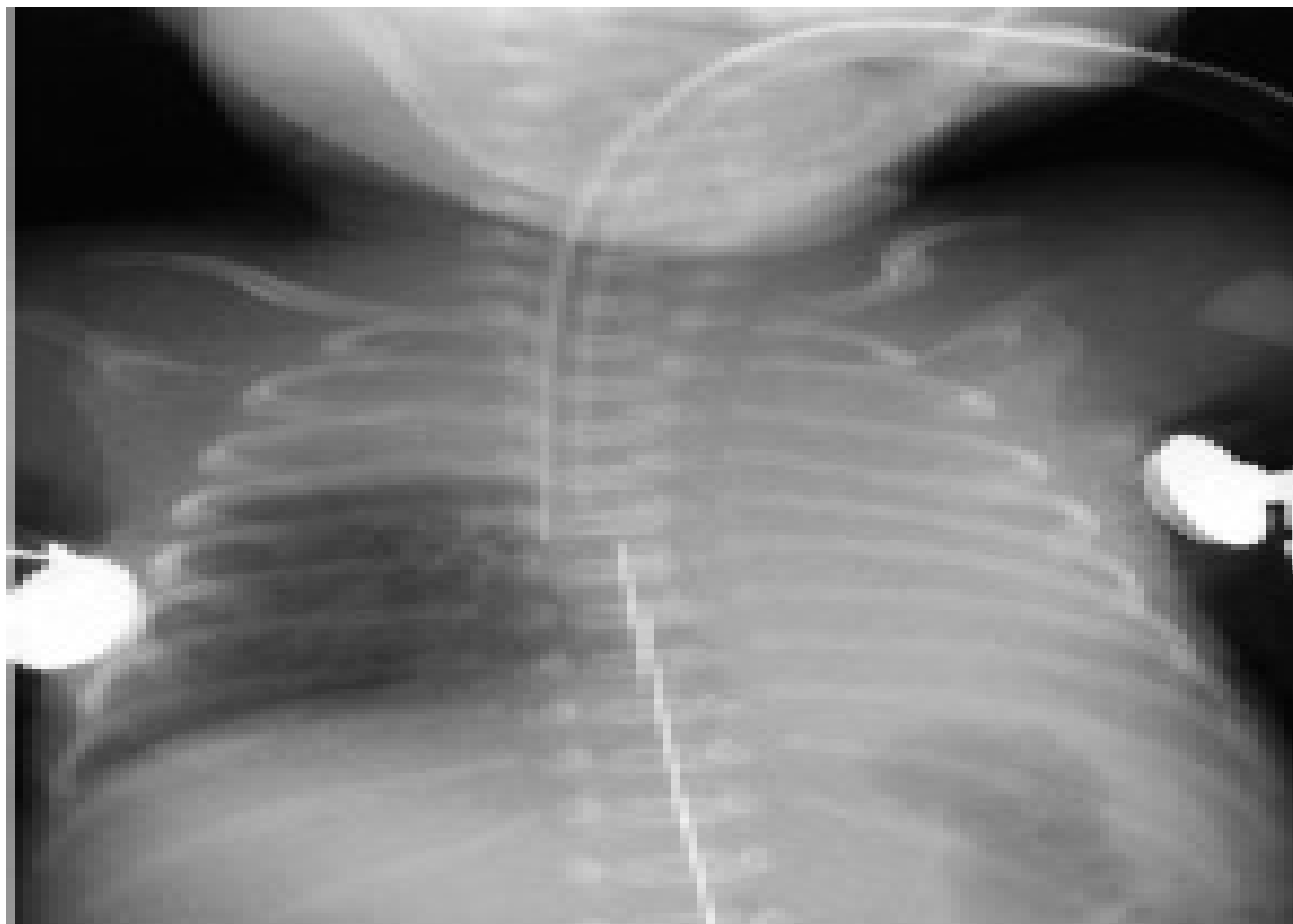




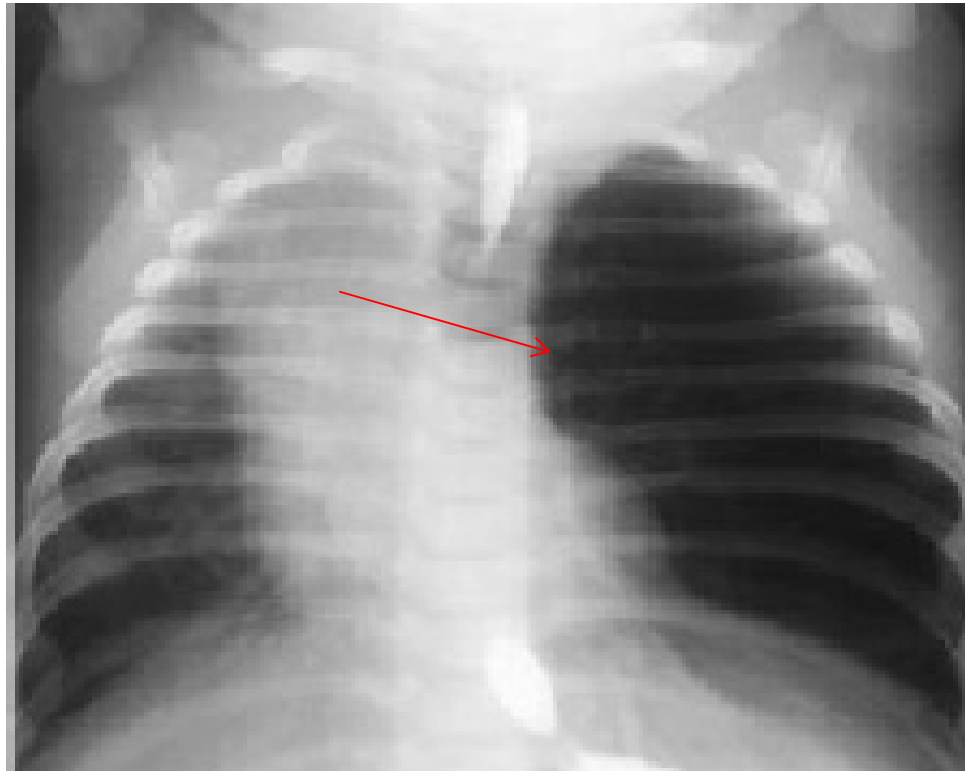




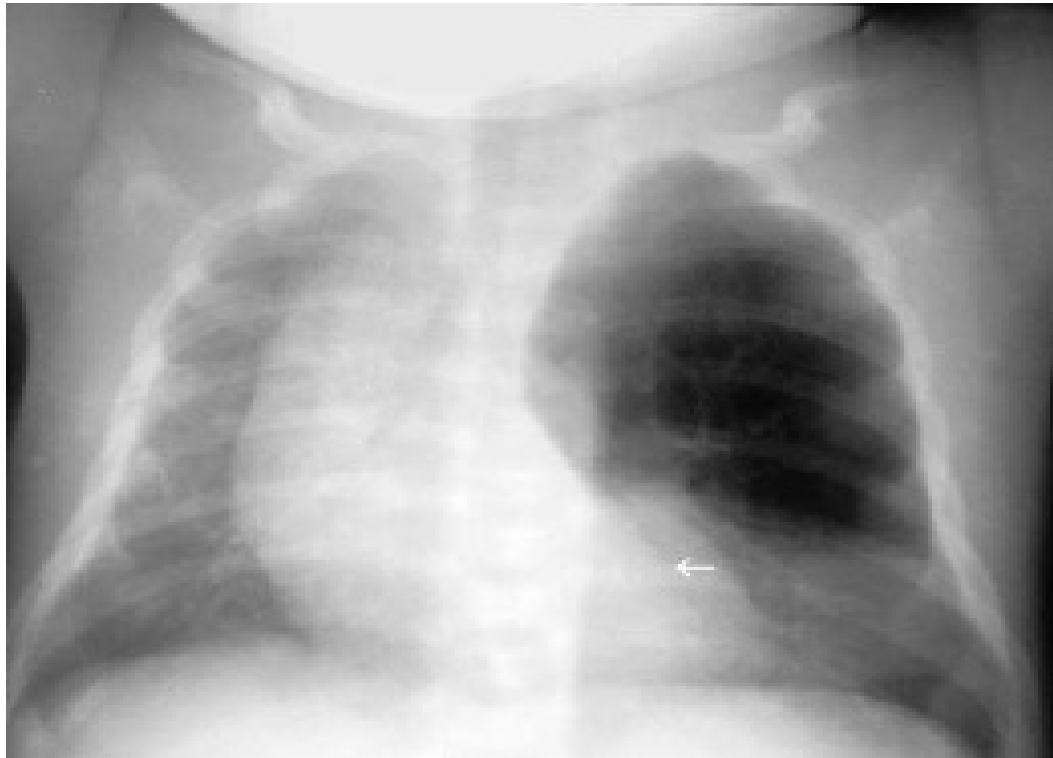




Congenital Lobar Emphysema



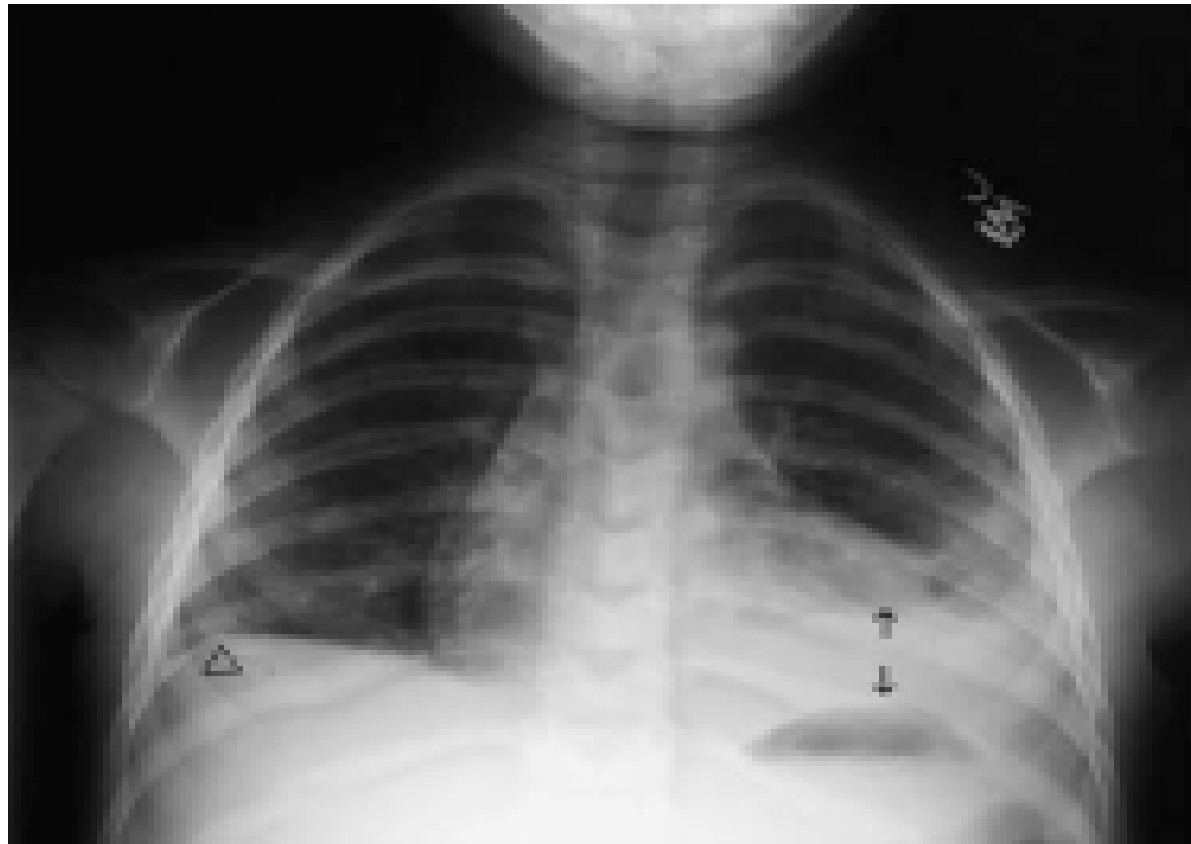
Developmental anomaly of the lower respiratory tract that is characterized by hyperinflation of one or more of the pulmonary lobes



Hyperexpanded and hyperlucent lobe, adjacent atelectasis, and contralateral mediastinal shift

The left upper lobe is affected most often (40 to 50 percent of cases)

Pleural Effusion



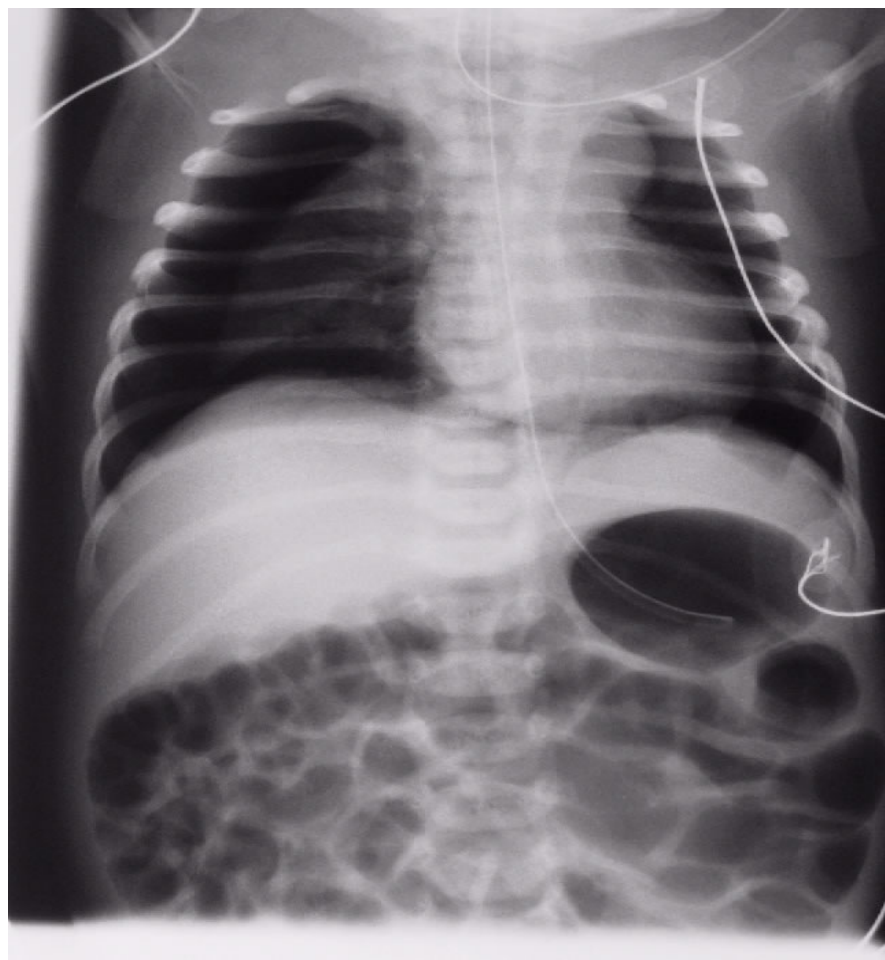


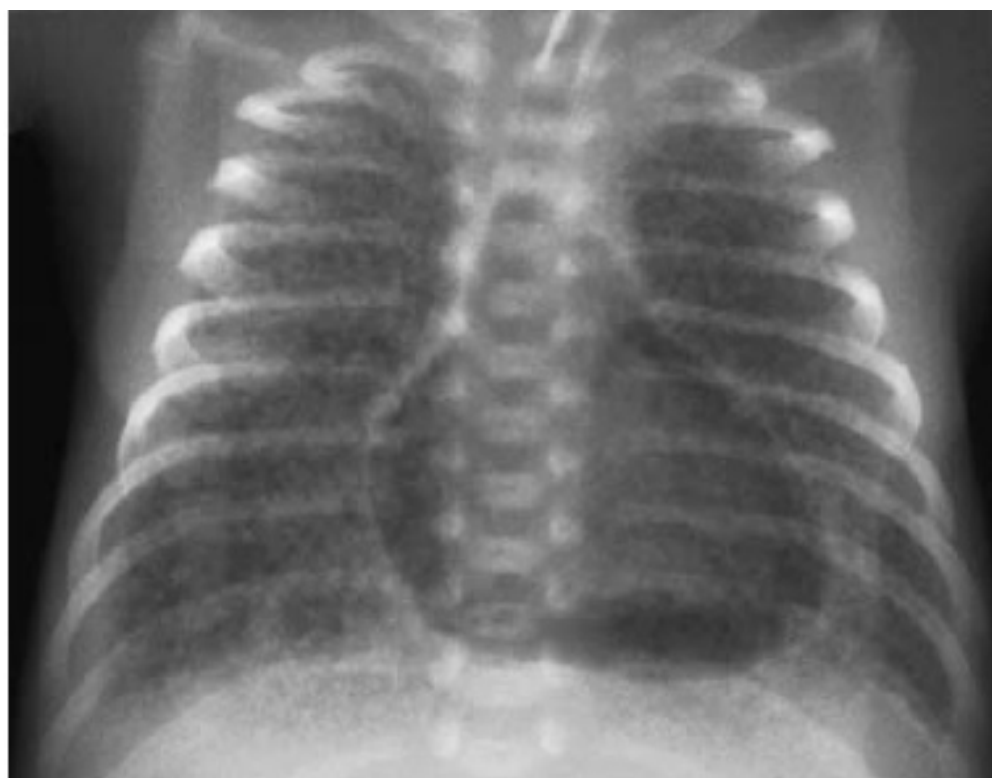
Hydrops





QUIZ







Thank You